GEME-4000/H4000/S4000
5000/X5000/S5000 Series

General Embedded Machine Engine

User's Manual

Recycled Paper

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Detail Description			
Suggestions for ADLINK			

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1

Introduction

1.1 Product Overview

The General Embedded Machine Engine (GEME) 4000/5000 series is a complete embedded solution for Machine Automation/ Machine Vision/ Vision system integrators who are looking for a embedded controller to run their CPU-intensive applications.

GEME is a rugged and compact chassis that supports an embedded SBC and power supply unit with optional storage peripherals, such as CompactFlash cards or a 2.5" HDD. Software compatibility, reliability and OS size issues can be avoided through its built-in embedded software.

Although GEME is highly integrated, it can be further expanded with PMC modules and PC/104 extension modules supporting motion, vision, DIO, communications, and High Speed Link applications.

With both hardware and software integrated in a single package, GEME is optimized for performance and will deliver the best reliability to our customers.

Some important features of GEME are listed below:

- Low power consumption, fanless CPU applied for embedded applications
- Versatile functionalities: motion, vision, DIO, communications, High Speed Link
- Expandable enclosure design for PMC and PC104 modules
- Compact and rugged system design with wall-mounting kit
- OS support: Windows CE, Windows XP Embedded, and Linux

This chapter is designed to give you an overview of GEME's platform. The chapter covers the following topics:

- Unpacking Checklist
- GEME Family
- Specifications
- Dimensions and Explode Drawing

1.2 Unpacking Checklist

Check the shipping carton for any damage. If the shipping carton and contents are damaged, notify the dealer for a replacement. Retain the shipping carton and packing material for inspection by the dealer. Obtain authorization before returning any product to ADLINK.

Check the following items are included in the package, if there are any missing items, contact your dealer:

Product	Included Items

GEME-4000/5000 series
 	
(Basic Base system)
	• All-in-one support CD-ROM (software & manuals)
	• Wall mounting kit:
	  ▪ Wall mounting bracket (x4)
	  ▪ M4 8mmScrew (8)
	• Power cord (L=1.8M, country of use to be specified while ordering) (for AC type only)
	• PS/2 Y cable
	• IDE flat cable (40 pin, L=57cm)
	• FDD flat cable (34pin, L=52cm)
	• 4-pin DC output harness for external drive (43cm)

GEME-H4000/X5000/S4000/S5000 series
 	
(Advanced Base System)
	• All-in-one support CD-ROM (software & manuals)
	• Wall mounting kit:
	  ▪ Wall mounting bracket (x4)
	  ▪ M4 8mmScrew (8)
	• Power cord (L=1.8M, country of use to be specified when ordering) (for AC type only)
	• PS/2 Y cable

Note: (1) The packaging of the GEME OEM version with non-standard configuration, functionality, or package may vary according to different configuration requests.

CAUTION: The board fitted inside the GEME system must be protected from static discharge and physical shock. Never remove any of the socketed parts except at a static-free workstation. Use the anti-static bag shipped with the product to handle the board. Wear a wrist strap grounded through one of the system's ESD Ground jacks when servicing system components.

1.3 GEME Family

The GEME 4000/5000 family can be classified by CPU performance into the 4000 and 5000 series. It can be further distinguished by the availability of vision functionality and interfaces. Extension modules can be ordered to provide other functions not standard on the base unit. Please refer to the following table for available base units in the GEME family.

1.3.1 Name Rule

GEME 4000 is the product series with Celeron M CPU and GEME-5000 is the product series with Pentium M CPU.

GEME 4000, GEME-5000 start with Basic Base system. With several different specific PMC module installed, we call them Advanced Base system. On all the Base systems, several more PC-104 modules can be added.

The Basic Base system is equipped with the IDE interface and FDD interface.

With the 2nd digit , it is used to identify the different CPU. Please refer to the below table for reference.

	CPU
GEME-42000 / GEME-∀42000	Celeron M 1.0GHz
GEME-52000 / GEME-∀52000	Pentium M 1.4GHz
GEME-53000 /GEME-∀53000	Pentium M 1.1GHz

The “∀” mark is the alphabet used to identify the different function, where :

X: embedded PMC module with 4 channels video capture, which can support up to 120 fps

H: embedded PMC module with H/W MPEG4.

S: embedded PMC module with PCMCIA, CF and 2 USB2.0 ports

1.4 Specifications

		GEME-4000	GEME-H4000	GEME-5000	GEME-X5000
SBC	SBC Model No.	EBC-P400			
	CPU	Ultra Low Voltage Celeron M		Low Voltage Pentium M	
	Cache	512 KB on-die Advanced Transfer Cache (ATC)		1 MB/2 MB on-die Advanced Transfer Cache (ATC)	
	System Memory	One SODIMM socket for up to 1GB DDR333			
	Chipset	Intel 855GME Graphics and Memory Controller Hub (GMCH)			
		Intel I/O Controller Hub 4 (ICH4)			
	VGA	● On-board VGA controller built-in AGP (3D hyper pipelined architecture)			
		● Up to 1600 x 1200 in 32-bit color at 85Hz refresh rate			
		● Video memory sharing from main memory with Intel Dynamic Video Memory Technology (DVMT)			
		● Up to 64 MB of dynamic video memory allocation			
	DVI, LVDS (Optional)	18-bit LVDS interface DVI interface, compliant with DVI specification 1.0			
	TV-Out (Optional)	BNC Connector			
	BIOS	Award BIOS, support PnP			
	Video Capture	No	WIS H/W MPEG4 encoder processor 4-CH CIF compress, 4-CH CIF preview	No	Four Conexant Fusion878A Video decoder processor 4-CH NTSC/PAL input
	USB	Two USB ports, USB 2.0 compliant			
	IEEE 1394	Texas Instruments TSB43AB23 1394a-2000 OHCI PHY/link-layer controller Three IEEE-1394 ports (two external , one internal)			
	Ethernet	Intel 82562EM 10BaseT/100BaseTx			
	Enhanced IDE	Bus Master IDE controller, EIDE interfaces for up to two devices, support PIO Mode 3/4 or Ultra DMA/100 IDE devices, including Hard Disk Drive, ATAPI CD-ROM, LS120, and ZIP drives.			
	CompactFlash	50 pin socket for CompactFlash Type I/II			
	Super I/O Chipset	Winbond W83627HF			

	Hardware Monitoring	Built-in Winbond W83627HF, monitoring CPU temperature, voltage and battery,+3.3V,+5V,+12V voltage			
	COM Ports	COM1/ COM2: 16550 UART compatible ports with RS-232 interface,COM2 also supports RS-422,RS-485			
	Parallel Port	One high-speed parallel port, SPP/EPP/ECP mode			
	Keyboard/Mouse	Combed PS/2 type mini-DIN connectors			
	Floppy Interface	None			
	PMC Interface	1 on-board 32-bit 33Mhz PMC module socket for functionally expansion			
	PC104 Interface	16-bit, PC/104 interface for functionally expansion			
	Watchdog Timer	Time-out timing select 1-255 seconds			
	Dimensions	129mm x 167.5mm			
		GEME-4000	GEME-H4000	GEME-5000	GEME-X5000
System	Power Supply (optional)	Universal input AC 100 VAC to 220 VAC, Max. output : +5V 11.5A, +12V 3A, -12V 0.5A			
		DC input: 10VDC to 30VDC, Max. input current: 13A at 10VDC, Max. output: +5V 10A, +12V 1.5A, -12V 0.3A			
	Operating Temp.	-10˚-55˚C	-10˚-50˚C	-10˚-55˚C	-10˚-50˚C
	Humidity	0%-90%			
	Dimensions	183x140x95.36 mm (wall mount kit not included) [16.84 mm(H) for each extension kit]			
	Power Consumption	With 512MB DDRAM +5V 4.0A, +12V 300mA		With 512MB DDRAM +5V 5.5A, +12V 300mA	
		Test conditions: (1) CPU 100% loading (2) No HDD, CD ROM, extension module			
	Power Output	+5V Max. 1A, +12V Max. 1A	None	+5V Max. 1A, +12V Max. 1A	None
	Storage	One 44-pin IDE removable HDD	one 44-pin IDE HDD	One 44-pin IDE removable HDD	one 44-pin IDE HDD
	GPIO (TTL)	none	Four digital input, Four digital output,	none	Four digital input, Four digital output,
	Operating System	Windows CE, Windows XP Embedded, Linux			

	Random Vibration	Operating: 5-100Hz, 0.00142 g2/Hz; 100-500Hz, -6dB/Octave, 0.5Grms, 3axes, 30 minutes/axis Non-operating: 5-100Hz , 0.02g2/Hz ; 100-500Hz , -6dB/Octave, 1.88Grms, 3 axes,1hr/axis (IEC 68-2-64)

Warning! Always disconnect the power cord from your chassis whenever you are working on it. Do not connect the power cord while the power switch is on. A sudden rush of power can damage sensitive electronic components. Only authorized and experienced electronics personnel should open the chassis.

Caution! Always ground yourself to remove any static electric charge before touching GEME. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.

2

Base Unit

This chapter will familiarize the user with available GEME interfaces and connections before getting started and includes the following information:

- Dimensions
- Base Unit Connector Pin Assignments

2.1 Dimensions

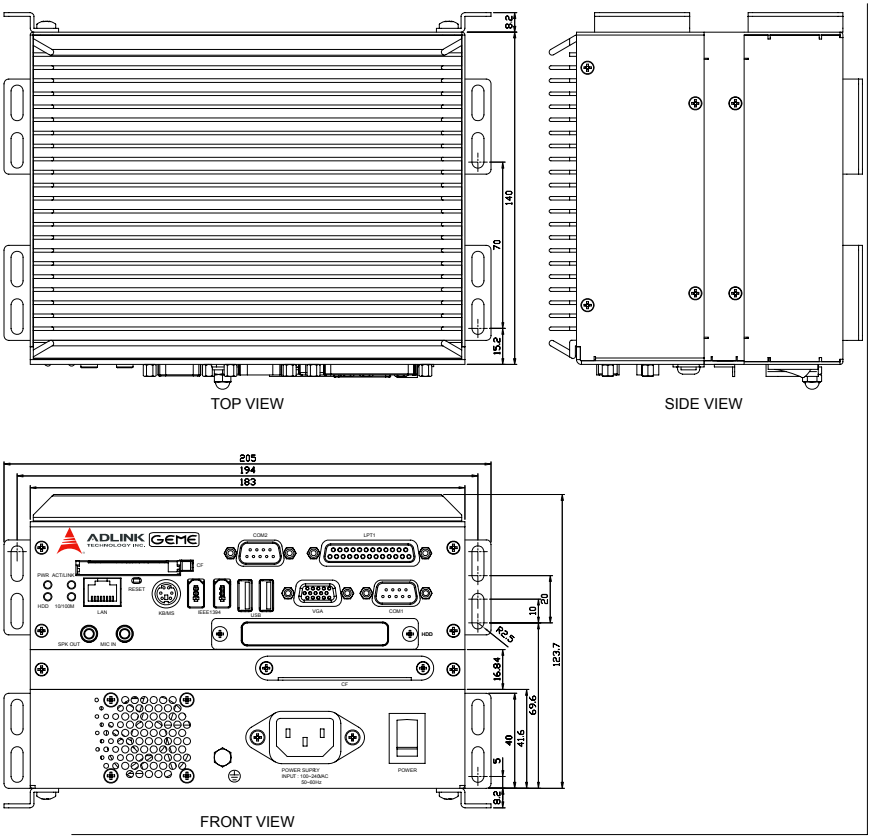


Figure 1. GEME-4000/5000 base unit dimensions

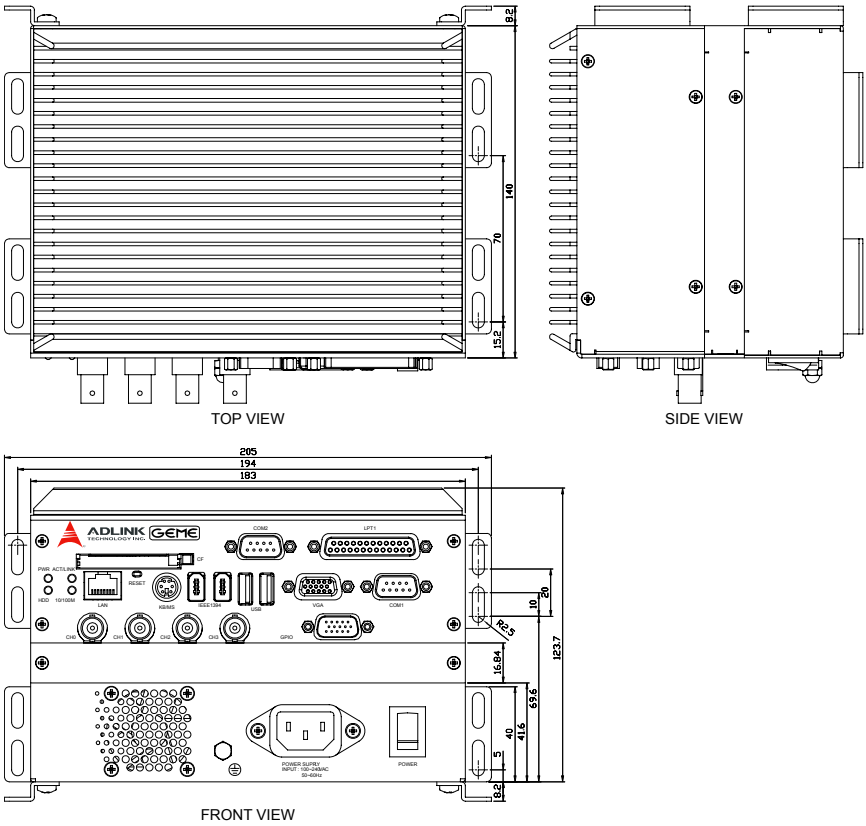


Figure 2. GEME-H4000/X5000 base unit dimensions

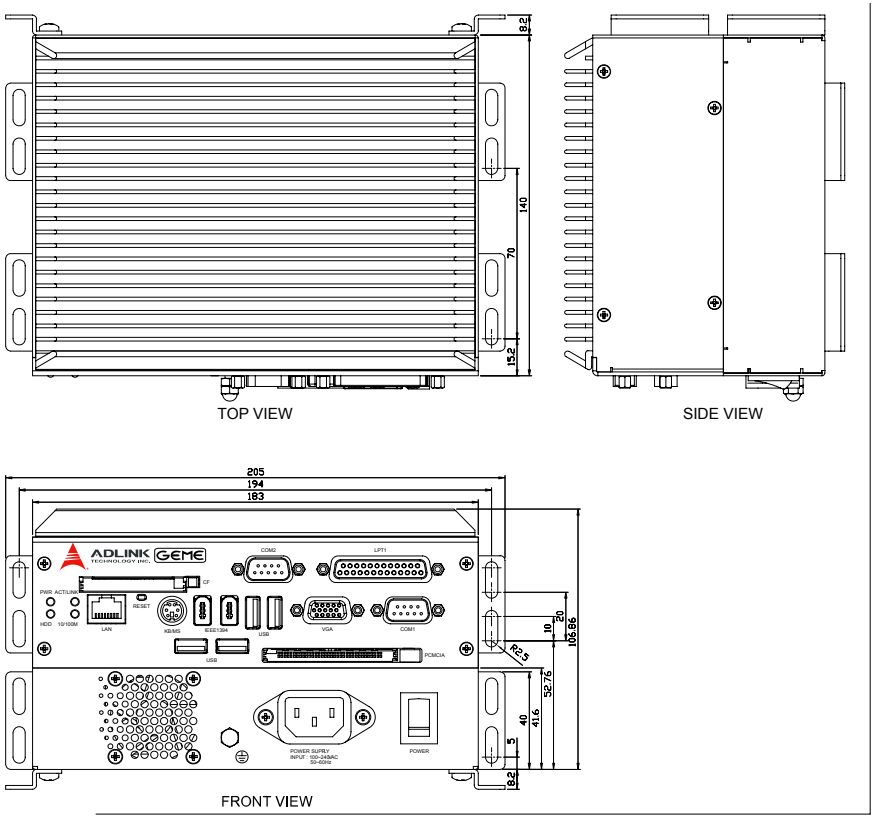


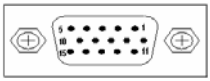
Figure 3. GEME-S4000/S5000 dimensions

2.2 Base Unit Connector Pin Assignments

Detailed descriptions and pin-outs for each connector are given in the following sections.

■ 2.2.1 VGA Connector

GEME provides a VGA controller for a high resolution VGA interface. It supports VGA and VESA, up to 1280 x 1024 @ 24 bpp, and video memory sharing from main memory with Intel Dynamic Video Memory Technology (DVMT). Memory size is controlled by the device driver from 1 MB up to 11 MB

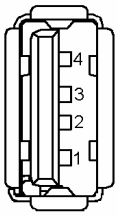


Signal Name	Pin	Pin	Signal Name
Red	1	2	Green
Blue	3	4	N.C.
GND	5	6	GND
GND	7	8	GND
+5V	9	10	GND
N.C.	11	12	DDCDAT
HSYNC	13	14	VSYNC
DDCCLK	15		

■ 2.2.2 USB Connector (2 Ports)

The USB connectors can be used for connecting any device that conforms to the USB 2.0 specification. Many recent digital devices conform to this standard. The USB interface supports *Plug and Play* and *Hot Swapping*, which recognizes devices automatically and enables you to connect or disconnect a device whenever you want without powering down the computer.

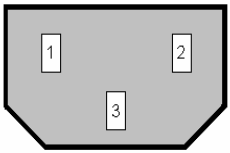
- **GEME provides two connectors for USB interfaces**
- **Plug & Play and hot swapping for up to 127 external devices is supported.**
- **Compliant with USB Specification Rev. 2.0; individual over-current protection.**



Pin #	Signal Name
1	VCC
2	USB-
3	USB+
4	Ground

■ 2.2.3 AC input connector

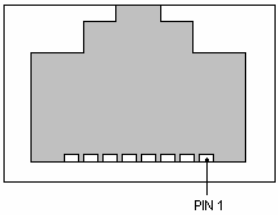
GEME comes with an AC inlet connector that carries 100~240 V_{AC} external power input, and features reversed wiring protection.



PIN	SIGNAL
1	Neutral
2	Line
3	Earth Ground

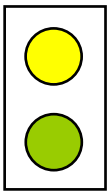
■ 2.2.4 Ethernet (RJ-45) Connector

GEME is equipped with Intel Ethernet LAN controller that is fully compliant with IEEE 802.3u 10/100Base-T CSMA/CD standards. The Ethernet port provides a standard RJ-45 jack on board, and LED indicators on the front side to show its Speed (Yellow LED) and Active/Link (Green LED) status.



Pin	Signal Name
1	TD+
2	TD-
3	RD+
4	NC
5	NC
6	RD-
7	NC
8	NC

LAN status LED



LED Color	Status	Function
Yellow (Speed status)	ON	100Mbps
	OFF	10Mbps
Green (Link status)	ON	Link
	OFF	Link off
	Blinking	Data transfer in progress

■ 2.2.5 COM1/COM2

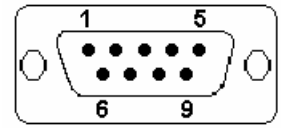
GEME offers two serial communications interface ports: COM 1 and COM 2.

IRQ and Address Setting

The IRQ and I/O address range are both assigned by BIOS. The table below describes COM1/COM2 default settings:

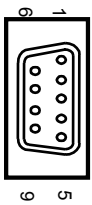
COM Port	Mode	Bass address	IRQ
COM 1	RS-232	3F8h	IRQ4
COM 2	RS-232	2F8h	IRQ3

COM1/COM2 Pin Assignment



Pin	RS-232
1	DCD, Data carrier detect
2	RXD, Receive data
3	TXD, Transmit data
4	DTR, Data terminal ready
5	GND, ground
6	DSR, Data set ready
7	RTS, Request to send
8	CTS, Clear to send
9	RI, Ring indicator

Note: COM2 can also support RS422 or RS485 (with Auto direction function) by adjusting jumper. The customer has to request this feature while placing the order.

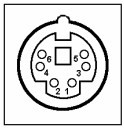


COM 2		
Pin no.	RS422	RS485
1	TX-	D-
2	TX+	D+
3	RX+	--
4	RX-	--
5	GND	GND
6	--	--
7	--	--

8	--	--
9	--	--

■ 2.2.6 Integrated PS/2 KBD/MS connector

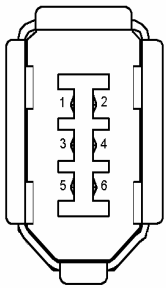
GEME has a proprietary interface for PS/2 keyboard and mouse connections. A 6-pin mini-DIN connector is located on the rear panel of GEME. A proprietary ADLINK Y-cable is used to convert the 6-pin mini-DIN connector to two 6-pin mini-DIN connectors for the PS/2 keyboard and PS/2 mouse connections. The power provided to the keyboard and mouse is protected by a polyswitch rated at 1.1A.



PIN	SIGNAL	FUNCTION
1	KBDAT	Keyboard Data
2	MSDAT	Mouse Data
3	GND	Ground
4	KBMS5V	Power
5	KBCLK	Keyboard Clock
6	MSCLK	Mouse Clock

■ 2.2.7 IEEE1394 Connector

GEME comes with two IEEE 1394 interfaces, which are fully Plug & Play compliant and hot swappable. GEME's IEEE 1394 interface fully supports the IEEE 1394-1995 standard for high-performance serial bus and the IEEE 1394a-2000 supplement. Full IEEE 1394a-2000 support includes: connection debounce, arbitrated short reset, multi speed concatenation, arbitration acceleration, fly-by concatenation, and port disable/suspend/resume. GEME has two IEEE 1394a-2000 fully compliant cable ports with transfer rates of 100/200/400 megabits per second (Mbits/s).



PIN	SIGNAL
1	+12V
2	GND
3	TPB0-
4	TPB0+
5	TPA0-
6	TPA0+

■ 2.2.8 Compact Flash Connector

GEME's standard CompactFlash (CF) socket has an ATA interface that is fully compatible with an IDE HDD and supports both type-I and type-II CF cards. The CF socket is on the Secondary IDE port.

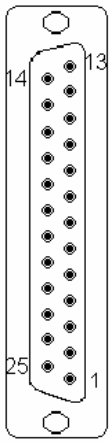
■ 2.2.9 Parallel Port connector

Parallel I/O interface signals are routed to a DB25 socket on the front panel. This port supports full IEEE-1284 capability and provides a basic printer interface that supports EPP and ECP enhanced port modes

IRQ and Address Setting

The IRQ, I/O address range and mode are all assigned by BIOS.
The following table outlines the parallel port default settings:

Parallel Port Mode	Bass address	IRQ
SPP	378h	IRQ7

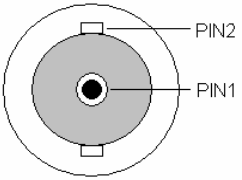


Signal Name	Pin #	Pin #	Signal Name
Line printer strobe	1	14	AutoFeed
PD0, parallel data 0	2	15	Error
PD1, parallel data 1	3	16	Initialize
PD2, parallel data 2	4	17	Select
PD3, parallel data 3	5	18	Ground
PD4, parallel data 4	6	19	Ground
PD5, parallel data 5	7	20	Ground
PD6, parallel data 6	8	21	Ground
PD7, parallel data 7	9	22	Ground
ACK, acknowledge	10	23	Ground
Busy	11	24	Ground
Paper empty	12	25	Ground
Select	13	N/A	N/A

■ 2.2.10 Video Capture BNC connector (GEME-H4000/X5000)

GEME accepts 4 channels standard composite color (PAL, NTSC) or monochrome video formats (CCIR, EIA).

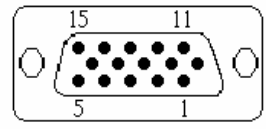
Video resolution is programmable including the square-pixel (640 x 480 or 768 x 576) and the broadcast resolution.



PIN	SIGNAL
1	Video Signal
2	GND

■ 2.2.11 GPIO connector (GEME-H4000/X5000)

GEME's I/O lines are TTL compatible and support single-input, single-output and single-software trigger lines.



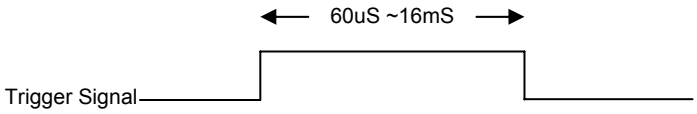
PIN	SIGNAL	PIN	SIGNAL
1	Digital Input 0	9	Digital Output 3
2	Digital Input 1	10	GND
3	Digital Input 2	11	GND
4	Digital Input 3	12	GND
5	GND	13	GND
6	Digital Output 0	14	GND
7	Digital Output 1	15	+5V
8	Digital Output 2		

The I/O lines are internally pulled up and have the following characteristics:

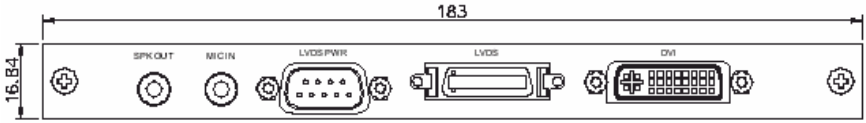
Voltage	MIN	MAX
Input high voltage (5μA)	2.0 V	5.25V
Input low voltage (-5μA)	0.0V	0.80V
Output high voltage (-1.0mA)	5.0V	-
Output low voltage (100.0mA)	-	0.5V

Software trigger output :

Programmable trigger scale, from 60uS ~ 16mS



■ 2.2.12 DVI/LVDS, Audio Connector



3

Power Supply Unit

The entire GEME series can support either AC or DC power supplies per application requirements. The power supply unit is internally integrated into GEME system. This chapter shows the following detailed information:

- Dimensions
- Specifications

3.1 Dimensions

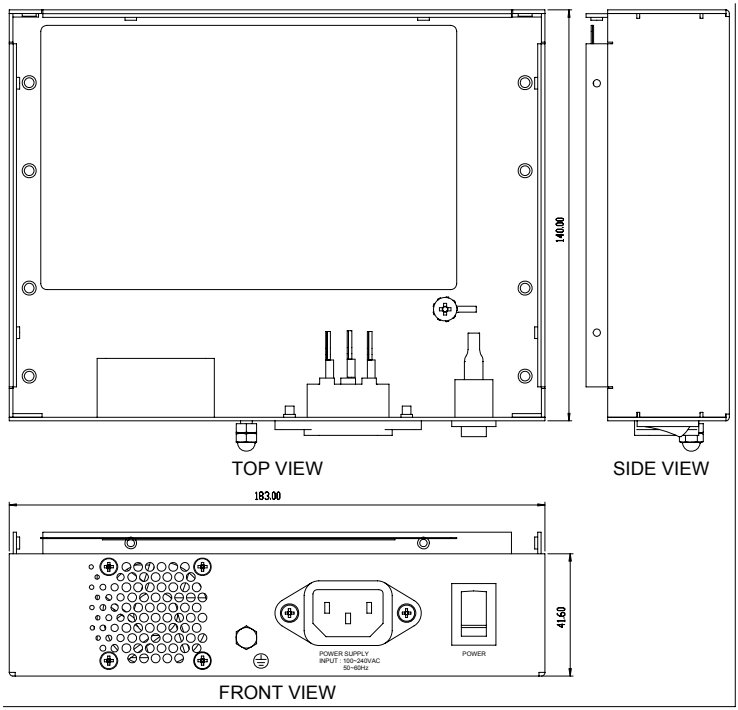


Figure 4. GEME AC type power supply unit dimensions

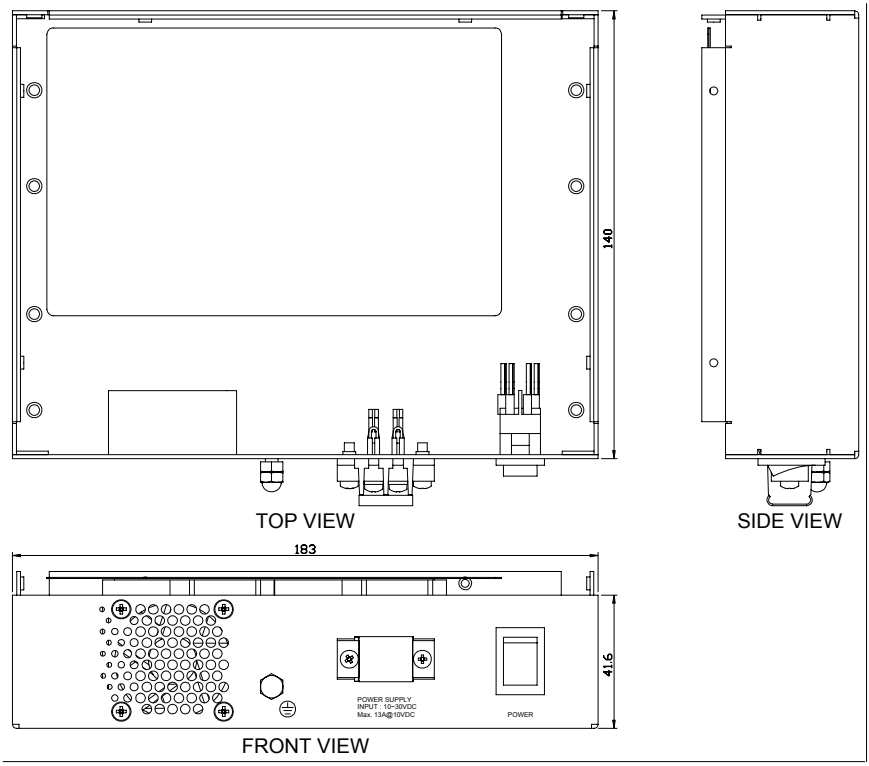


Figure 5. GEME DC type power supply unit dimensions

3.2 Specifications

■ 3.2.1 AC Power Supply

The AC power supply is a triple output 110W switching power supply, which is designed to meet Harmonics EN61000-3-2.

Input Specifications

Input voltage	The range of input voltage is from 91VAC to 264VAC. The nominal voltage is 115VAC 60Hz and 230VAC 50Hz.
Input frequency	The range of input frequency is from 47Hz to 63Hz
Input current	The maximum input current is 2A at 115VAC 1A at 230VAC
Inrush current	The inrush current will not exceed 30A at 115VAC input or 60A at 230VAC input, cold start, 25 degree C

Output Specifications

Output	Rated load	Peak load
+5V	11.5A	15A
+12V	3A	5A
- 12V	0.5A	0.5A

International Standards

Safety standards	UL 60950 CSA 22.2 NO.234 EN 60 950
EMI standards	FCC docket 20780 curve "B" EN 55022 "B" EN 61000-3-2
EMS standards	EN61000-4-2 6KV contact discharge, 8KV air discharge criteria A EN61000-4-3 10V/m Criteria A EN61000-4-4 2KV Criteria A

■ 3.2.1 DC Power Supply

The DC power supply is a 72 Watt triple-output switching power supply, specially designed for microprocessor-based applications; DC input from 10V to 30V; enclosed type.

Input Specifications

Input voltage	This power supply can operate continuously from +10VDC to +30VDC, normal line is +24VDC.
Input current	The maximum input current is 13A at 10VDC
Inrush current	The maximum inrush current will not exceed 25A at 12VDC input from a cold start, with exclusion of EMI capacitors

Output Specifications

Output	Rated load	Peak load
+5V	10A	14A
+12V	1.5A	3A
- 12V	0.3A	

International Standards

Safety standards	UL 1950 CSA 22.2 No. 234 VDE EN 60950
EMI standards	FCC docket 20780 curve “B” EN55022 class ”B”
EMS standards	IEC-801-2 8KV air discharge IEC-801-3 3V/M IEC-801-4 2KV

4

Getting Started

4.1 IDE Boot Sequence Settings

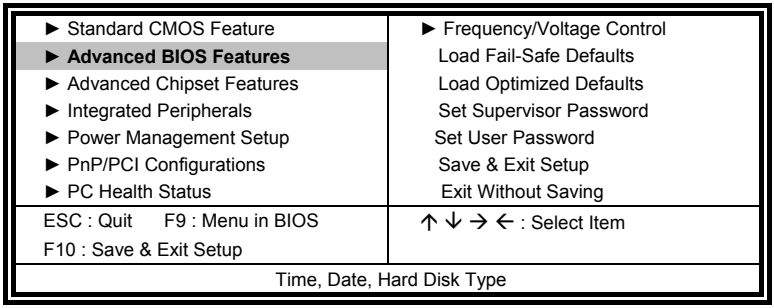
	IDE device1			IDE device 2			IDE device 3
IDE Primary Master	HDD-0	--	--	HDD-0	HDD-0	--	HDD-0
IDE Primary Slave	--	HDD-0	--	HDD-1	--	HDD-0	HDD-1
IDE Secondary Master	--	--	HDD-0	--	HDD-1	HDD-1	HDD-2

The Phoenix-Award BIOS provides a Setup utility program for specifying system configuration and settings. The Setup utility is stored in BIOS ROM. When you power up the system, BIOS is activated. Immediately pressing the <Del> key allows you to enter the Setup utility. If you are slow to press the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking Setup. If you still wish to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system off and back on again. On power up, the following message will appear on the screen:

```
Press <DEL> to Enter Setup
```

In the Setup utility program, you can make changes by pressing the arrow keys to highlight items, <PgUp> and <PgDn> keys to change entries, <Enter> to select, <F1> for help and <Esc> to quit. When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Phoenix-AwardBIOS CMOS Setup Utility


► Standard CMOS Feature
► Advanced BIOS Features
► Advanced Chipset Features
► Integrated Peripherals
► Power Management Setup
► PnP/PCI Configurations
► PC Health Status
► Frequency/Voltage Control
Load Fail-Safe Defaults
Load Optimized Defaults
Set Supervisor Password
Set User Password
Save & Exit Setup
Exit Without Saving
ESC : Quit F9 : Menu in BIOS
F10 : Save & Exit Setup
↑ ↓ → ← : Select Item
Time, Date, Hard Disk Type

For IDE boot sequence setting, please select “Advanced BIOS Feature”:

Phoenix – AwardBIOS CMOS Setup Utility
Advanced BIOS Features

Virus Warning	Disabled	Item Help
CPU Internal Cache	Enabled	
External Cache	Enabled	Menu Level ►
CPU L2 Cache ECC Checking	Enabled	
Quick Power On Self Test	Enabled	
First Boot Device	Floppy	
Second Boot Device	HDD-0	
Third Boot Device	LS120	
Boot Other Device	Enabled	
Swap Floppy Drive	Disabled	
Boot Up Floppy Seek	Enabled	
Boot Up NumLock Status	On	
Gate A20 Option	Fast	
Typematic Rate Setting	Disabled	
Typematic Rate (Chars/Sec)	6	
Typematic Delay (Msec)	250	
Security Option	Setup	
OS Select For DRAM > 64MB	Non-OS2	

↑ ↓ → ← : Move Enter : Select +/-/PU/PD : Value F10 : Save ESC : Exit F1 : General Help
F5 : Previous Values F6 : Fail-Safe Defaults F7 : Optimized Defaults

■ First/Second/Third/Other Boot Device

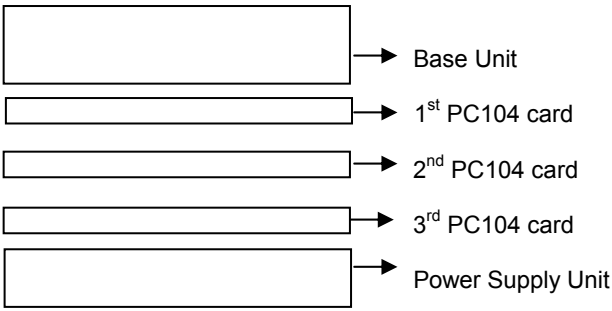
BIOS attempts to load the operating system from the devices in the sequence selected in the following items. The settings are:

Disabled	Floppy	LS120
HDD-0	SCSI	CDROM
HDD-1	HDD-2	HDD-3
ZIP100	LAN	

HDD-0, HDD-1, HDD-2 are for IDE device, and HDD-3 is not used.

4.2 IRQ Information

The IRQ & base address settings in the GEME system are according to the "assembly order" of the PC104 cards in GEME system. Please see the follow illustration:

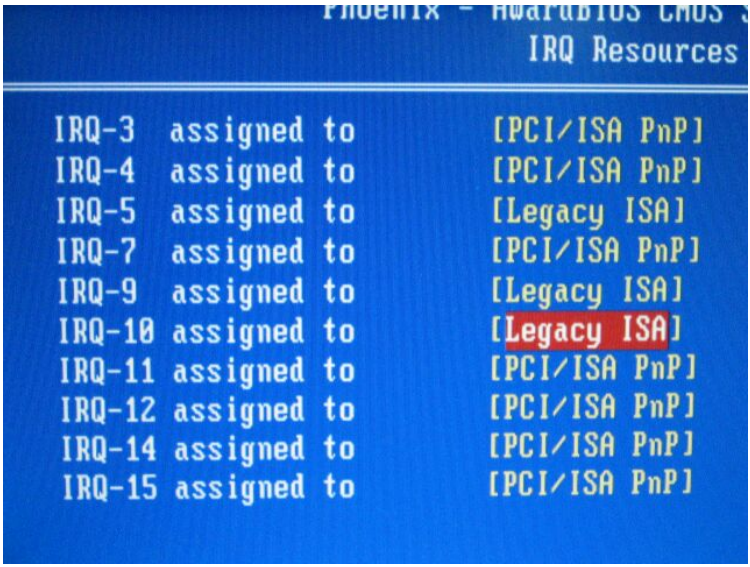


	1st PC104 card	2nd PC104 card	3rd PC104 card
I/O Address	300	200	280
IRQ No.	9	5	10
Memory Address	D0000	D4000	D8000

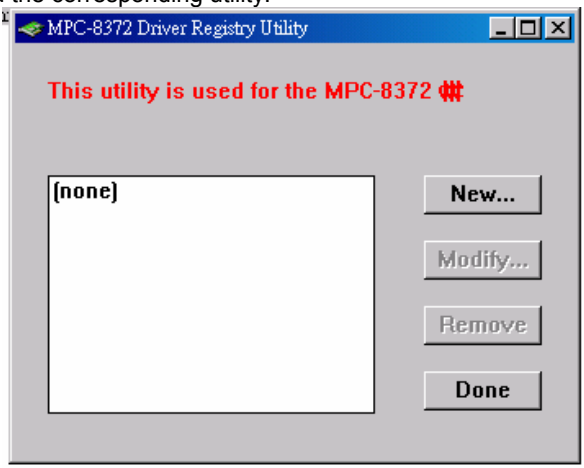
4.3 Software Settings

GEME system software is well installed before shipping according to the customers' configuration options. This section provides the necessary information for the customers who need to rebuild OS.

Step1:
Check IRQ resources setting in BIOS.(Please set the IRQ number according to your system configuration and see the details on **section 4.3**). For example, you have to change the settings of IRQ 5, 9, 10 as "Legacy ISA" in BIOS if there are three PC 104 cards in GEME. The remaining IRQ settings are as "PCI/ISA PnP". When you boot up GEME, press "DEL" key to enter BIOS setting screen as follows.

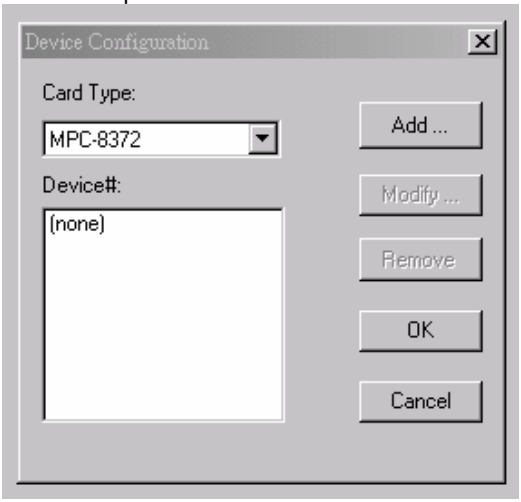

IRQ Resources
IRQ-3 assigned to [PCI/ISA PnP]
IRQ-4 assigned to [PCI/ISA PnP]
IRQ-5 assigned to [Legacy ISA]
IRQ-7 assigned to [PCI/ISA PnP]
IRQ-9 assigned to [Legacy ISA]
IRQ-10 assigned to [Legacy ISA]
IRQ-11 assigned to [PCI/ISA PnP]
IRQ-12 assigned to [PCI/ISA PnP]
IRQ-14 assigned to [PCI/ISA PnP]
IRQ-15 assigned to [PCI/ISA PnP]

Step2:
You have to register your PC104 card in Windows system. For example, you can find the “Registry Utility” from MPC-8372 folder after installing the MPC-8372 driver. The screen is as follows. If you have other PC 104 module in GEME, you can also find the corresponding utility.

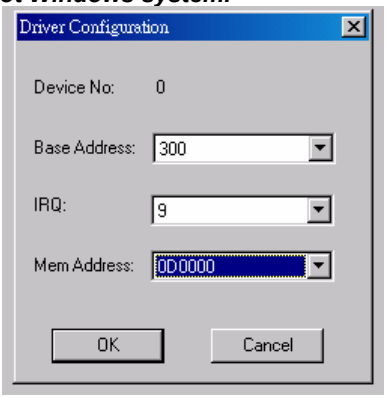


After pressing “New” button in the above screen, you will see the “Device Configuration” dialog. Please add the corresponding PC104 card information depending on how many cards you have in GEME. For example, you can add

one MPC-8372 card in the dialog if there is only one MPC-8372 in GEME. Please press “New” to the next step.



Refer to the table in **section 4.3** to select the “Base Address”, “IRQ”, and “Mem Address”. For example, the setting is as following dialog if you have one MPC-8372 card in GEME. Press the “OK” button to save this setting. ***It will take effect after you reboot Windows system.***



4.4 Software Support

If you liken GEME to a human body, the I/O would be the eyes, ears, hands, and feet; the CPU and bus the nervous system; and the software the brain, the “organ” that coordinates every operation of GEME. Hence, the operating

system's importance is beyond comparison as it is responsible for managing core tasks and resource allocation for the hardware. It not only affects future system execution time and efficiency, but also resource requirements during software development for the whole application.

Selecting a suitable OS suitable for different application requirements is an important task for system developers. When choosing an OS, they need to consider these points: stability, real-time capability, multitasking, human-machine interface (or GUI), memory size, and total cost (including application development costs, licensing costs for multiple copies, software engineering manpower, maintenance costs, etc). There isn't necessarily only one correct choice. System developers should look at the overall situation and focus on what provides the optimal solution for the developed system when considering this issue. In this respect, GEME is allows system developers maximum flexibility by being compatible with several operating systems.

4.4.1 Operation System Support

Windows 2000/XP

Windows2000/XP supports GEME's chipset drivers, allowing the user to install Windows 2000/XP themselves. ADLINK also provides OS pre-installation service for Windows 2000/XP on GEME (with a Windows 2000/XP license pre-purchased from ADLINK). As Windows 2000/XP requires a large amount of storage space, a harddrive is the best solution storage choice for GEME running Windows 2000/XP.

Linux

Most Linux versions (e.g. RedHat, Suse, etc) also support GEME's chipset drivers, allowing users to install Linux themselves). As Linux also requires a large amount of storage space, a hard drive is the best solution storage choice for GEME running Linux.

Windows XP Embedded

Windows XP is a multitasking OS known for its stability. As a result of its overwhelming popularity, human-machine interfaces, and plentiful development tools, developing applications in Windows XP is comparatively simple. Microsoft carried over the advantages of Windows XP when releasing Embedded XP. The concept behind the design of Embedded XP is simply a modularized Windows XP. System developers only select the needed Windows XP components and functions and then organize them together to construct an XP Embedded OS.

By using this architectural modularization, system integrators can readily reduce the storage space requirements of XP Embedded. The only factor determining storage space requirements is the number of function modules needed. Because XP Embedded is completely compatible with Windows XP,

developers can compile controller software in the Windows XP environment, and then transfer the code to Embedded XP for immediate use. System developers do not need to learn any new tools to use XP Embedded. Their experience on Windows XP can be directly transferred to XP Embedded, thus lowering software development costs. Another advantage is that the cost of licensing Embedded XP is much less than that of Windows XP.

Currently ADLINK provides the standard XP Embedded OS image for GEME (customers must pre-purchase an XP Embedded license from ADLINK), The standard XP Embedded OS image provided by ADLINK is about 200 MB for the English language version, and 400 MB for Chinese language version. For this OS configuration, a CF card is the best storage device for GEME. The major functions inside the standard XP Embedded OS image are as follows

- XP Embedded OS Kernel
- Drivers for GEME H/W and peripheral cards
- TCP/IP Networking
- TCP/IP with file sharing and client for Microsoft network
- Internet Explorer
- File Manager
- Language Support

The standard XP Embedded OS image can meet most application needs. If the customer has special functional requirements for XP Embedded, please contact ADLINK's field application engineers (FAE) for more detail about this OEM service**.**

Windows CE

Windows CE 4.2 incorporates a fresh new look. Because Windows CE is designed with embedded systems in mind, it requires much less storage space than does XP Embedded. Windows CE typically needs 64MB of storage space and it is possible to reduce this amount if necessary. An important feature of Windows CE supports real-time functionality. Microsoft has tried to keep API naming conventions and the development process consistent between Windows CE and Windows XP. But because Windows CE has an embedded architecture (as compared with Windows XP's desktop system concept), the software development process will have significant differences. Newcomers to the embedded world must keep this in mind. Another factor to consider when deciding whether to use Windows CE is that licensing costs are much less than XP Embedded, thanks to Microsoft's recent promotions.

Currently ADLINK offers the standard WinCE OS image for GEME (customer must purchase the WinCE license from ADLINK), The standard WinCE OS image requires about 25 MB for the English language version, and 30 MB for the Chinese language version. For this OS configuration, a CF card is the best storage device for GEME. The major functions included with the standard WinCE OS image are as follows.

- WinCE OS Kernel
- Drivers for GEME H/W and peripheral cards
- TCP/IP Networking
- Internet Explorer
- File Manager
- Language Support

The standard WinCE OS image can meet most application requirements. If the customer has special functional requirements for WinCE, please contact ADLINK's FAE for more details about this OEM service.

4.4.2 Driver Support

Driver support for GEME's peripheral cards under the different OS systems are outlined in the following table. Users can find drivers for these peripheral cards in ADLINK ALL-IN-ONE CD (Automation):

Motion Cards

Module No.	Bus Interface	Description	Win2000, XP & eXP driver	Win CE driver	Linux driver
MPC-8164	PC104	4-axis pulse type motion	Ready	Ready	Ready
MPC-8372/ 8366	PC104	12/6-axis SSCNET motion	Ready	Call for status	Call for status

Communication Cards

Module No.	Bus Interface	Description	Win2000, XP & eXP driver	Win CE driver	Linux driver
PMC-3534G	PMC	4 port asynchronous serial comm..	Ready	Ready	Ready
PMC-3544G	PMC	4 port RS-422/485 isolated serial comm..	Ready	Ready	Ready
PMC-7841G	PMC	CAN bus communication card	Ready	Call for status	Call for status

HSL Card

Module No.	Bus Interface	Description	Win2000, XP & eXP driver	Win CE driver	Linux driver
PMC-7852G	PMC	HSL Serial I/O master card	Ready	Ready	Ready

DIO Card

Module No.	Bus Interface	Description	Win2000, XP & XP driver	Win CE driver	Linux driver
MPC-7632/64	PC104	32/64 CH Digital I/O	Ready	Ready	Ready

■ 4.4.3 GEME Driver Installation List

	WinXP/2k	WinXP embedded*(1)	WinCE	Linux*(2)
GEME add-on cards	Built-in OS	Test & registration programs are built-in ADLINK standard image(C:\ADLINK)	Built-in ADLINK standard image	..
Vision	Built-in OS	View Creator utility is built-in ADLINK standard image(C:\ADLINK\ Angelo)	Built-in ADLINK standard image	Kernel 2.6.9

Note*(1)
ADLINK will pre-install the hardware driver, utility, and runtime library on GEME. For developing program in the Host PC, the user must install the corresponding software package with ADLINK all-in-one CD.
Note*(2)
Please check with ADLINK FAE about WinCE & Linux

*** With the ADLINK-ALL-IN-ONE (Automation) CD, users can install drivers for Windows 2000/XP systems. For XP Embedded systems, if the XP Embedded OS is built by ADLINK, ADLINK will pre-install the drivers for GEME's peripheral cards in the OS image. If users build XP Embedded OS image, they can also use ADLINK-ALL-IN-ONE (Automation) CD for driver installation.

*** Currently the Linux drivers ADLINK provides for GEME's peripheral cards are based on Kernel 2.4.18 (RedHat 7.3 compatible). ADLINK also provides Kernel 2.4.20 (RedHat 8.0 and 9.0 compatible) and Kernel 2.4.22(RedHat compatible) driver re-compiler service for customers. If users require this service, please contact ADLINK's FAE for more details. For driver support for other Linux releases, please contact ADLINK's FAE for current support status.

5

Extension Modules

5.0 Extension Modules Overview

■ 5.0.1 Product series

GEME system is designed to be extendable by one PMC and up to 3 PC104 modules. This chapter provides information about compatible extension modules:

Function	Bus	Model Name.	Description
Motion	PC104	MPC-8164	4-axis stepping & servo motion control card
	PC104	MPC-8372	12-axis SSCNET servo motion control card
Comm.	PMC	PMC-3534G	4-port RS-232 serial communication module
	PMC	PMC-3544G	4-port RS-422/RS-485 serial communication module
	PMC	PMC-7841G	CAN bus communication card
HSL	PMC	PMC-7852G	High Speed Link master controller interface module
DIO	PC104	MPC-7632	32-CH Digital I/O module
	PC104	MPC-7664	64-CH Digital I/O module

Note. If you need more detailed information about the above cards, please see the specific manuals.

5.1 MPC-8164

5.1.1 Features

- 16-bit PC104 Bus
- axes of step and direction pulse output for controlling stepping or servomotor
- Maximum output frequency of 6.55 MPPS
- Pulse output options: OUT/DIR, CW/CCW
- Programmable acceleration and deceleration time for all modes
- Trapezoidal and S-curve velocity profiles for all modes
- Any 2 of 4 axes circular interpolation
- Any 2-4 of 4 axes linear interpolation
- Continuous interpolation for contour following motion
- Change position and speed on the fly
- Change speed by comparator condition
- 13 home return modes with auto searching
- Hardware backlash compensator and vibration suppression
- Software end-limits for each axis
- 28-bit up/down counter for incremental encoder feedback
- Home switch, index signal(EZ), positive, and negative end limit switches interface on all axes
- 2-axis high speed position latch input
- 2-axis position compare trigger output with 4k FIFO auto-loading
- All digital input and output signals are 2500Vrms isolated
- Programmable interrupt sources
- 8 channels of general purpose photo-isolated digital inputs
- 8 channels of general purpose open collector digital outputs
- Software supports a maximum of up to 4 MPC-8164 cards (16 axes) operation in one system
- Includes Motion Creator, Microsoft Windows-based application development software
- MPC-8164 Libraries and Utilities for DOS and Windows 98/NT/2000/XP. Also support Windows XP/NT Embedded
- MPC-8164 Libraries for Linux and Windows CE systems

■ 5.1.2 CN2 Pin Assignments: Main connector

CN2 is the major connector for the motion control I/O signals.

No.	Name	I/O	Function (axis①/②)	No.	Name	I/O	Function (axis③/④)
1	VPP	O	+5V power supply output	51	VPP	O	+5V power supply output
2	GND		Ext. power ground	52	GND		Ext. power ground
3	OUT1+	O	Pulse signal (+),①	53	OUT3+	O	Pulse signal (+), ③
4	OUT1-	O	Pulse signal (-),①	54	OUT3-	O	Pulse signal (-),③
5	DIR1+	O	Dir. signal (+),①	55	DIR3+	O	Dir. signal (+), ③
6	DIR1-	O	Dir. signal (-),①	56	DIR3-	O	Dir. signal (-), ③
7	SVON1	O	Multi-purpose signal, ①	57	SVON3	O	Multi-purpose signal, ③
8	ERC1	O	Dev. ctr, clr. signal, ①	58	ERC3	O	Dev. ctr, clr. signal, ③
9	ALM1	I	Alarm signal, ①	59	ALM3	I	Alarm signal, ③
10	INP1	I	In-position signal, ①	60	INP3	I	In-position signal, ③
11	RDY1	I	Multi-purpose signal, ①	61	RDY3	I	Multi-purpose signal, ③
12	GND		Ext. power ground	62	EXGND		Ext. power ground
13	EA1+	I	Encoder A-phase (+), ①	63	EA3+	I	Encoder A-phase (+), ③
14	EA1-	I	Encoder A-phase (-), ①	64	EA3-	I	Encoder A-phase (-),③
15	EB1+	I	Encoder B-phase (+), ①	65	EB3+	I	Encoder B-phase (+),③
16	EB1-	I	Encoder B-phase (-), ①	66	EB3-	I	Encoder B-phase (-),③
17	EZ1+	I	Encoder Z-phase (+), ①	67	EZ3+	I	Encoder Z-phase (+),③
18	EZ1-	I	Encoder Z-phase (-), ①	68	EZ3-	I	Encoder Z-phase (-),③
19	VPP	O	+5V power supply output	69	VPP	O	+5V power supply output
20	GND		Ext. power ground	70	GND		Ext. power ground
21	OUT2+	O	Pulse signal (+), ②	71	OUT4+	O	Pulse signal (+),④
22	OUT2-	O	Pulse signal (-), ②	72	OUT4-	O	Pulse signal (-),④
23	DIR2+	O	Dir. signal (+), ②	73	DIR4+	O	Dir. signal (+),④
24	DIR2-	O	Dir. signal (-), ②	74	DIR4-	O	Dir. signal (-),④
25	SVON2	O	Multi-purpose signal, ②	75	SVON4	O	Multi-purpose signal, ④
26	ERC2	O	Dev. ctr, clr. signal, ②	76	ERC4	O	Dev. ctr, clr. signal, ④
27	ALM2	I	Alarm signal, ②	77	ALM4	I	Alarm signal, ④
28	INP2	I	In-position signal, ②	78	INP4	I	In-position signal, ④
29	RDY2	I	Multi-purpose signal, ②	79	RDY4	I	Multi-purpose signal, ④
30	GND		Ext. power ground	80	GND		Ext. power ground
31	EA2+	I	Encoder A-phase (+), ②	81	EA4+	I	Encoder A-phase (+), ④
32	EA2-	I	Encoder A-phase (-), ②	82	EA4-	I	Encoder A-phase (-), ④
33	EB2+	I	Encoder B-phase (+), ②	83	EB4+	I	Encoder B-phase (+), ④
34	EB2-	I	Encoder B-phase (-), ②	84	EB4-	I	Encoder B-phase (-), ④
35	EZ2+	I	Encoder Z-phase (+), ②	85	EZ4+	I	Encoder Z-phase (+), ④
36	EZ2-	I	Encoder Z-phase (-), ②	86	EZ4-	I	Encoder Z-phase (-), ④
37	PEL1	I	End limit signal (+), ①	87	PEL3	I	End limit signal (+), ③
38	MEL1	I	End limit signal (-), ①	88	MEL3	I	End limit signal (-), ③
39	CMP1	O	Position compare output ①	89	LTC3	I	Position latch input ③
40	SD/PCS1	I	Ramp-down signal ①	90	SD/PCS3	I	Ramp-down signal ③
41	ORG1	I	Origin signal, ①	91	ORG3	I	Origin signal, ③
42	GND		Ext. power ground	92	GND		Ext. power ground
43	PEL2	I	End limit signal (+), ②	93	PEL4	I	End limit signal (+), ④
44	MEL2	I	End limit signal (-), ②	94	MEL4	I	End limit signal (-), ④
45	CMP2	O	Position compare output ②	95	LTC4	I	Position latch input, ④
46	SD/PCS2	I	Ramp-down signal ②	96	SD/PCS4	I	Ramp-down signal ④
47	ORG2	I	Origin signal, ②	97	ORG4	I	Origin signal, ④
48	GND		Ext. power ground	98	GND		Ext. power ground
49	GND		Ext. power ground	99	E_24V		Ext. power supply, +24V
50	GND		Ext. power ground	100	E_24V		Ext. power supply, +24V

■

■ 5.1.3 CN3 Pin Assignment: General Purpose DI/DO ports

CN3 Pin No	Signal Name	CN3 Pin No	Signal Name
1	DOCOM	2	DOCOM
3	DOCOM	4	DOCOM
5	DO0	6	DO1
7	DO2	8	DO3
9	DO4	10	DO5
11	DO6	12	DO7
13	--	14	DICOM
15	DICOM	16	DICOM
17	DICOM	18	DI0
19	DI1	20	DI2
21	DI3	22	DI4
23	DI5	24	DI6
25	DI7	26	--

■

■ 5.1.4 MPC-8164 Dimensions

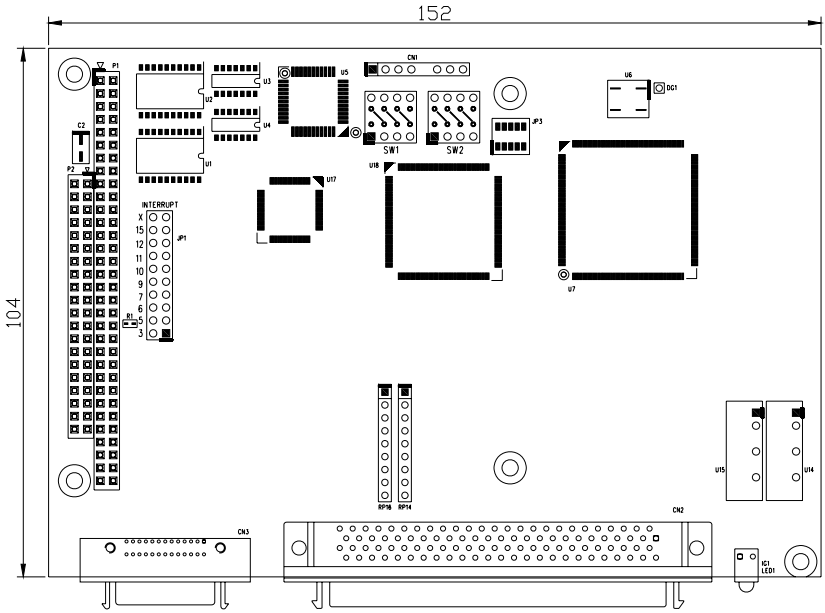


Figure 6. MPC-8164 PCB Layout

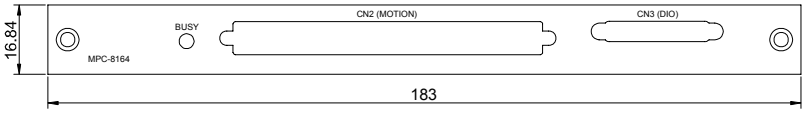


Figure 7. MPC-8164 Front panel

5.2 MPC-8366/8372

5.2.1 Features

MPC-8366/72 are 6/12-axis serial connection motion controller. They provide the advanced features as follows.

- PC/104 interface
- Servo interface: SSCNET II protocol (Update rate: 0.888 ms)
- Up to 6/12 axes
- 32-bit command resolution
- On-line servo tuning and data monitoring
- Easy wiring up to 30 meters
- Multiple axes linear interpolation
- Any 2 axes circular interpolation
- Contour following motion
- On-the-fly motion/ velocity change
- Programmable interrupt source
- Two 16-bit analog input channels.
- 32-bit external encoder channels
- Two differential pulse output channels
- Software support Windows 2K/XP
- MotionCreator™ and Trajectory Generator utility

5.2.2 Specifications

The following lists summarize the main specifications of the MPC-8366/72 board motion control system.

	Item	Description
System	Bus Type for PCI board	PCI Rev. 2.2, 33MHz
	Bus Type for MPC board	PC/104
	Bus width for PCI/MPC	32-bit / 16-bit
	Bus Voltage	5V
	Memory usage	16KByte

	IRQ on PCI board	Assigned by PCI controller
	IRQ on MPC board	Assigned by Software Utility
General Specifications	Operating temperature	0°C ~ 60°C
	Storage temperature	-20°C ~ 80°C
	Humidity	5 ~ 95%, non-condensing
	Power Consumption	PCI (MPC)-8372/8366: +5V @ 1 A typical
DSP	Type	TI TMS320C6711
	Clock	100MHz
	DSP performance	600 MFLOPS
Board Interface	I/O Connector	68-pin VHDIC
	SSCNet Connector	3M 10220-52A2JL
Driver Communication	Protocol	SSCNET II
	Bit Rate	5.625Mhz
	Physical layer	RS-485
	Maximum working length	30m for each 6 axes
	Error detection	CRC
Servo Loop	Max. No of controllable axes	8372 :12 ; 8366 : 6
	Servo update rate	0.888ms
	Servo Data Monitors	Current position Droop (deviation) Velocity Command Velocity feedback Torque command Servo alarm number …etc
	Servo parameter tuning	Parameter read/write
Motion Function	Motion Velocity Profile	Trapezoidal & S-Curve
	Single motion	Jog move
		Single axis P to P motion
		Change P/V on the fly
		Linear interpolation: up to 4 axes
		2-axis Circular interpolation
	Home move	2 home mode
	Continuous motion	Start / End motion list
		Add linear trajectory
		Add arc trajectory: 2 axes
		Add Dwell
		Smooth Trajectory
		Start/Sop command
		Load Trajectory from file
		Motion I/O status read/configure
		Motion status
Application Functions	Move Ratio	In unit of Pulse per mm
	Software Limit	Each axis has 2 soft limits
	Position Compare	Each axis has 2 comparators
	Interlock	2 axes interlock system
	System error check	Watchdog timer
Interrupt	During operation stop	Possible to select conditions where interrupt occurs

	During alarms, etc.	Yes
Optical Isolated Digital Input	+Limit Switch x 12 (PEL) -Limit Switch x 12 (MEL) Proximity dog x 12 (ORG) General Purposed Input x 2 (PCI board only) Emergency Stop x 1	● Sink or source type are selectable in all channels (all channels must be the same) ● Input voltage range: 0 ~ 24V Logic H: 14.4~24V Logic L: 0~5V ● Input resistor:4.7KΩ @ 0.5W ● DI change of state detection ● Isolated voltage: 500 Vrms ● Bandwidth: 10K Hz (0.1 ms)
Digital Output	DO x 2	● Output type: Open-collector (PC3H7) ● Sink Current: 6.5mA Min. ● Isolated voltage: 500 VDC ● Bandwidth: 10K Hz(0.1 ms)
Analog Out	DA x 2	● Resolution: 16 bits ● Settling Time: 10μS Max. ● Output Range: ±10V ● Output Coupling: DC ● Output Impedance: 30Ω Max. ● Output Driving: ±5mA max. ● Power On State: Floating ● Calibration: Self-Calibration ● Gain Error: ±3% Max. ● Offset Error: 1mV Max. for PCI board 0.2mV Max. for MPC board
Analog In	AD x 2 (Available for MPC/cPCI board)	● Resolution: 16 bits, no missing code ● Sampling Rate: 250kS/s ● Programmable Input Range: ±10V, ±5V, ±2.5V ● Calibration: Self-Calibration ● Gain Error: ±0.03% Max. ● Offset Error: 0.2mV Max.
Encoder Interface	32-bit Encoder input (A,B,Z) x 3 channel (PCI board) 2 channel (MPC/cPCI board)	● Incremental Encoder Input Max. Speed : 5Mhz ● Input Voltage: 0 - 5V dc ● Logic H: 3~5V ● Logic L: 0~2.4V ● Input resistor: 220Ω @ 0.125W ● Isolated voltage:500 Vrms
Pulse Output	2 channel differential pulses output (Available for MPC/cPCI board)	● OUT/DIR, CW/CCW, AB phase selectable ● Max. Output Frequency: 4.16 MHz

		● Isolated voltage:500 Vrms
Aux. DIO	Board to board synchronous interface (PCI board only)	CN4
	6 TTL Level Digital Output (at CN3 on Extension bracket of PCI board only)	● Voltage output high: Typical: 5V Min: 2.4v @ 15mA ● Voltage output low: Typical: 0.3V @ 24mA Max: 0.5V
	Optional bracket for SSCNET Axis 7-12 splitter and TTL Level Digital Output for PCI-8372 only	CN3 (A) , CN2 (A)

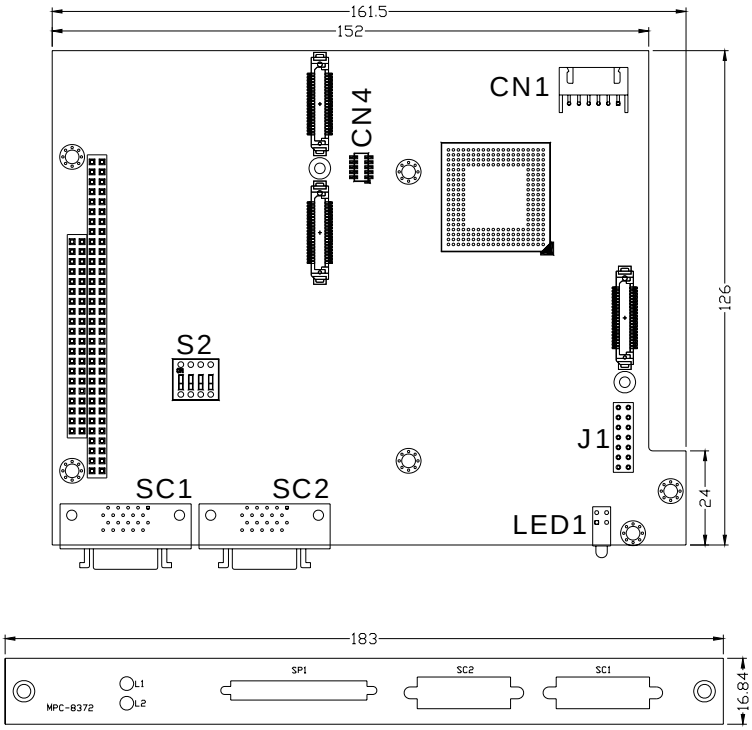
■ 5.2.3 SP1 Pin Assignment: I/O Connector of MPC-8372/66

No.	Name	I/O	Function Axis	No.	Name	I/O	Function Axis
1	DO_COM	-	Common for Digital Output	35	DO1	O	General Digital Output
2	PEL1/MDI1	I	Positive End Limit	36	DO2	O	General Digital Output
3	MEL1/MDI2	I	Minus End Limit	37	PEL2/MDI4	I	Positive End Limit
4	ORG1/MDI3	I	Origin Signal	38	MEL2/MDI5	I	Minus End Limit
5	PEL3/MDI7	I	Positive End Limit	39	ORG2/MDI6	I	Origin Signal
6	MEL3/MDI8	I	Minus End Limit	40	PEL4/MDI10	I	Positive End Limit
7	ORG3/MDI9	I	Origin Signal	41	MEL4/MDI11	I	Minus End Limit
8	PEL5/MDI13	I	Positive End Limit	42	ORG4/MDI12	I	Origin Signal
9	MEL5/MDI14	I	Minus End Limit	43	PEL6/MDI16	I	Positive End Limit
10	ORG5/MDI15	I	Origin Signal	44	MEL6/MDI17	I	Minus End Limit
11	IPT_COM/ EMG_COM	-	Common for Digital Input	45	ORG6/MDI18	I	Origin Signal
12	EA1+	I	Encoder A-Phase (+)	46	EA2+	I	Encoder A-Phase (+)
13	EA1-	I	Encoder A-Phase (-)	47	EA2-	I	Encoder A-Phase (-)
14	EB1+	I	Encoder B-Phase (+)	48	EB2+	I	Encoder B-Phase (+)
15	EB1-	I	Encoder B-Phase (-)	49	EB2-	I	Encoder B-Phase (-)
16	EZ1+	I	Encoder Z-Phase (+)	50	EZ2+	I	Encoder Z-Phase (+)
17	EZ1-	I	Encoder Z-Phase (-)	51	EZ2-	I	Encoder Z-Phase (-)
18	PEL7/MDI19	I	Positive End Limit	52	PEL8/MDI22	I	Positive End Limit
19	MEL7/MDI20	I	Minus End Limit	53	MEL8/MDI23	I	Minus End Limit
20	ORG7/MDI21	I	Origin Signal	54	ORG8/MDI24	I	Origin Signal
21	PEL9/MDI25	I	Positive End Limit	55	PEL10/MDI28	I	Positive End Limit

22	MEL9/MDI26	I	Minus End Limit	56	MEL10/MDI29	I	Minus End Limit
23	ORG9/MDI27	I	Origin Signal	57	ORG10/MDI30	I	Origin Signal
24	PEL11/MDI31	I	Positive End Limit	58	PEL12/MDI34	I	Positive End Limit
25	MEL11/MDI32	I	Minus End Limit	59	MEL12/MDI35	I	Minus End Limit
26	ORG11/MDI33	I	Origin Signal	60	ORG12/MDI36	I	Origin Signal
27	IPT_COM/ EMG_COM	-	Common for Digital Input	61	EMG	I	Emergency Stop Signal
28	P_GND	-	Common for Pulse Interface	62	AD1	I	Analog Input
29	OUT1+	O	Pulse signal (+)	63	DIR1+	O	Dir. signal (+)
30	OUT1-	O	Pulse signal (-)	64	AD2	I	Analog Input
31	OUT2+	O	Pulse signal (+)	65	DIR1-	O	Dir. signal (-)
32	OUT2-	O	Pulse signal (-)	66	DA1	O	Analog Output
33	DIR2+	O	Dir. signal (+)	67	DA2	O	Analog Output
34	DIR2-	O	Dir. signal (-)	68	A_COM	-	Analog Ground

*** MDI# is for general purpose input if it is not used for motion**

■ 5.2.4 Dimensions



SC1: SSCNET connector for Axis 0~5

SC2: SSCNET connector for Axis 6~11

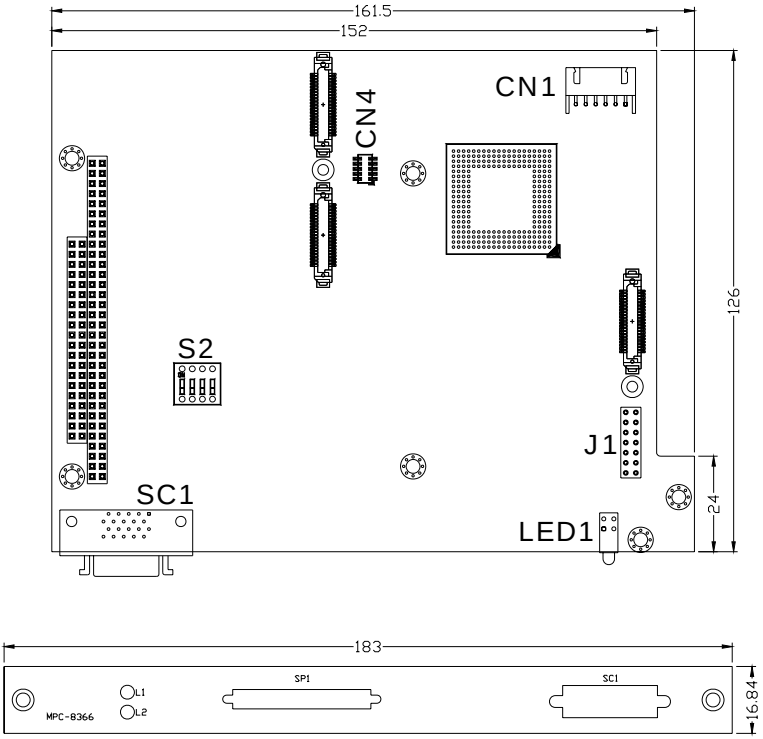
SP1: Daughter Board connector

LED1: Board Status LEDs

S2: DIP switch for I/O address setting

Figure 9. MPC-8372 PCB layout & front panel

■



SC1: SSCNET connector for Axis 0~5

SP1: Daughter Board connector

LED1: Board Status LEDs

S2: DIP switch for I/O address setting

Figure 10. MPC-8366 layout and front panel

5.3 MPC-7632/7632AU/7664

■ 5.3.1 Features

MPC-7632/7632AU/7664 isolated DIO cards provide the following advanced features:

- PC/104 interface
- 16/32 channels isolated digital input channel
- 16/32 channels isolated digital output channel
- High output current (80mA per channel)
- 2500 V_{RMS} voltage isolation
- One external interrupt channel
- inputs with change-of-state function
- High-level language function libraries
- Software supports DOS, Windows 98/NT/2K/XP, Linux 2.4 or higher, Windows CE, and Windows XP/NT Embedded.

■ 5.3.2 Specifications

	Parameter	Value
Optical Isolated Input Channels	Number of channels*	16 (MPC-7632) 32 (MPC-7664)
	External interrupt channels	1
	Input voltage	DC12V~24V (±10%)
	Input current	5~15mA/bit (Max)
	Turn-on time (off → on)	3.5us (Typ)
	Turn-off time (on → off)	50 us (Typ)
Optical Isolated Output Channels	Number of channels	16 (MPC-7632) 32 (MPC-7664)
	Voltage between terminals	DC30V (Max)
	Output current	80mA(Max)
	Output voltage drop	1.0 V(Max)
	Turn-on time (off → on)	2.8us (Typ)
	Turn-off time (on → off)	400us (Typ)
General Specifications	Current consumption	400mA @ +5V (±5%)
	Isolation voltage	2.5kV_{RMS} (Min)
Environmental Conditions	Operating Temperature	0ºC - 50ºC
	Operating Humidity	35% - 85%
Audio**	THD+N @ 1KHz	0.1%(Max) @ 200mW into 8Ω 0.1%(Typ) @ 85mW into 32Ω

* The first 3 input channels provide the Change-of-State functionality.

**Audio spec for MPC-7632AU only.

■ 5.3.3 CP1 Pin Assignment

The pin assignment of the 50-pin SCSI connector CP1 for the 7632/7632AU/7664 DIO cards is shown below:

No.	Name	I/O	Function of Axis	No.	Name	I/O	Function of Axis
1	INTCOM	-	Common for interrupt source	26	INT	I	Interrupt source input
2	DI0	I	Digital input	27	DICOM0	-	Common for digital input
3	DI1	I	Digital input	28	DI2	I	Digital input
4	DICOM0	-	Common for digital input	29	DI3	I	Digital input
5	DI4	I	Digital input	30	DICOM0	-	Common for digital input
6	DI5	I	Digital input	31	DI6	I	Digital input
7	DICOM0	-	Common for digital input	32	DI7	I	Digital input
8	DI8	I	Digital input	33	DICOM1	-	Common for digital input
9	DI9	I	Digital input	34	DI10	I	Digital input
10	DICOM1	-	Common for digital input	35	DI11	I	Digital input
11	DI12	I	Digital input	36	DICOM1	-	Common for digital input
12	DI13	I	Digital input	37	DI14	I	Digital input
13	DICOM1	-	Common for digital input	38	DI15	I	Digital input
14	DO0	O	Digital output	39	DOCOM0	-	Common for digital output
15	DO1	O	Digital output	40	DO2	O	Digital output
16	DOCOM0	-	Common for digital output	41	DO3	O	Digital output
17	DO4	O	Digital output	42	DOCOM0	-	Common for digital output
18	DO5	O	Digital output	43	DO6	O	Digital output
19	DOCOM0	-	Common for digital output	44	DO7	O	Digital output
20	DO8	O	Digital output	45	DOCOM1	-	Common for digital output
21	DO9	O	Digital output	46	DO10	O	Digital output
22	DOCOM1	-	Common for digital output	47	DO11	O	Digital output
23	DO12	O	Digital output	48	DOCOM1	-	Common for digital output
24	DO13	O	Digital output	49	DO14	O	Digital output
25	DOCOM1	-	Common for digital output	50	DO15	O	Digital output

■ 5.3.4 CP2 Pin Assignment

The pin assignment of the 50-pin SCSI connector CP2 for the 7664 is shown below:

No.	Name	I/O	Function of Axis	No.	Name	I/O	Function of Axis
1	NC	-	No connect	26	NC	I	No connect
2	DI16	I	Digital input	27	DICOM2	-	Common for digital input
3	DI17	I	Digital input	28	DI18	I	Digital input
4	DICOM2	-	Common for digital input	29	DI19	I	Digital input
5	DI20	I	Digital input	30	DICOM2	-	Common for digital input
6	DI21	I	Digital input	31	DI22	I	Digital input
7	DICOM3	-	Common for digital input	32	DI23	I	Digital input
8	DI24	I	Digital input	33	DICOM3	-	Common for digital input
9	DI25	I	Digital input	34	DI26	I	Digital input
10	DICOM3	-	Common for digital input	35	DI27	I	Digital input
11	DI28	I	Digital input	36	DICOM3	-	Common for digital input
12	DI29	I	Digital input	37	DI30	I	Digital input
13	DICOM3	-	Common for digital input	38	DI31	I	Digital input
14	DO16	O	Digital output	39	DOCOM2	-	Common for digital output
15	DO17	O	Digital output	40	DO18	O	Digital output
16	DOCOM2	-	Common for digital output	41	DO19	O	Digital output
17	DO20	O	Digital output	42	DOCOM2	-	Common for digital output
18	DO21	O	Digital output	43	DO22	O	Digital output
19	DOCOM2	-	Common for digital output	44	DO23	O	Digital output
20	DO24	O	Digital output	45	DOCOM3	-	Common for digital output
21	DO25	O	Digital output	46	DO26	O	Digital output
22	DOCOM3	-	Common for digital output	47	DO27	O	Digital output
23	DO28	O	Digital output	48	DOCOM3	-	Common for digital output
24	DO29	O	Digital output	49	DO30	O	Digital output
25	DOCOM3	-	Common for digital output	50	DO31	O	Digital output

■ 5.3.5 Dimensions

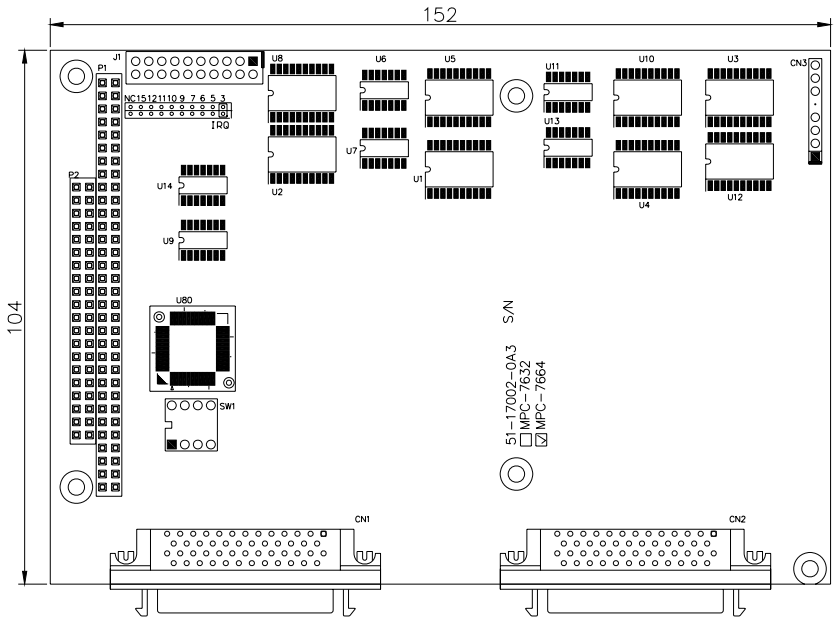


Figure 11. MPC-7664 PCB layout

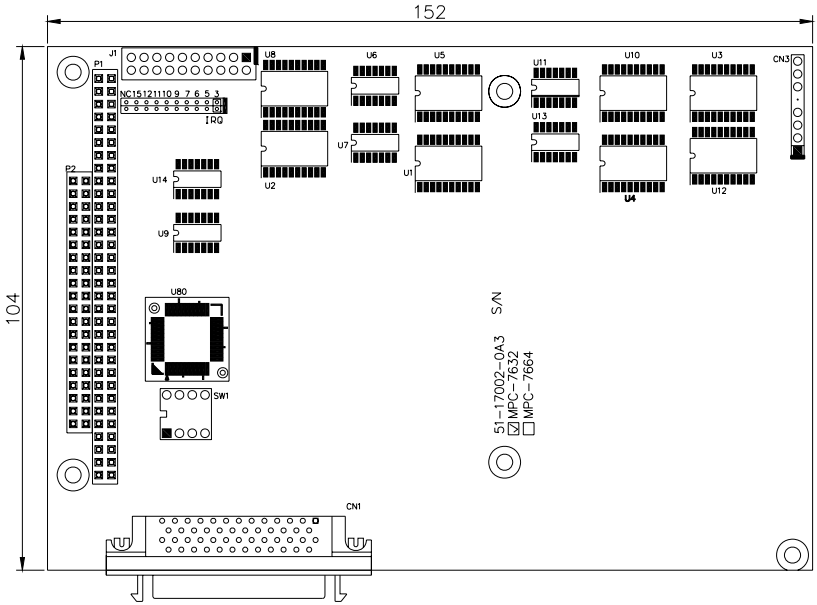


Figure 12. MPC-7632 PCB layout

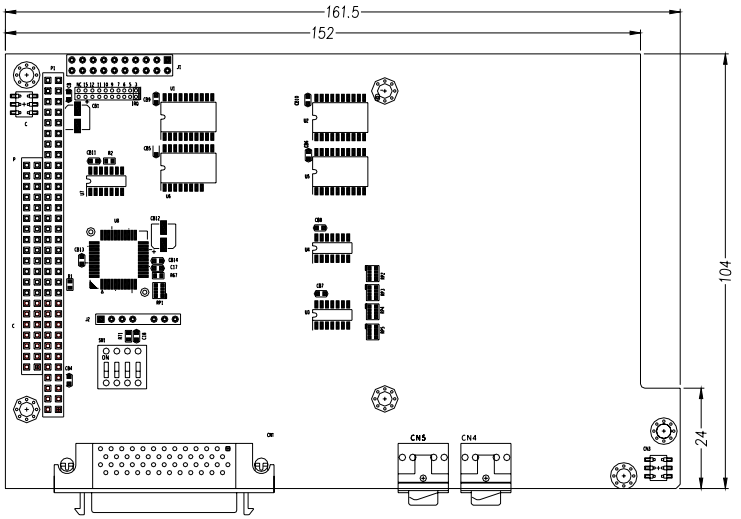


Figure 13. MPC-7632AU PCB layout

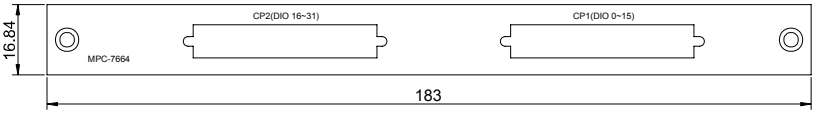


Figure 14. MPC-7664 front panel

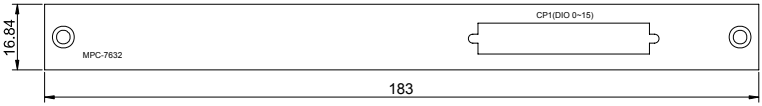
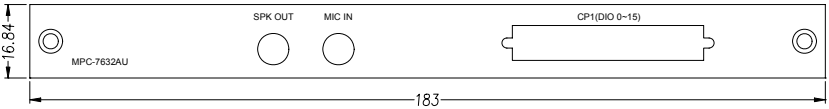


Figure 15. MPC-7632 front panel



5.4 PMC-RTV24G

5.4.1 Features

- 4-channel full-frame acquisition from single video stream
- Up to 30fps in 32-bit, 33MHz PMC bus
- Color (PAL / NTSC), monochrome (CCIR / EIA) cameras
- On-board TTL I/O lines
- User-friendly ViewCreator utility
- Software trigger supported

5.4.2 Specifications

Video Input

- Four composite video color digitizers
- Video input interface: 10-pin header connectors
- Coaxial cable recommended

General Purpose I/O Lines

The I/O lines are TTL compatible with 1 input and 1 output

GPIO interface:

- One 10-pin header connector
- I/O lines are internally pulled up and have the following characteristics:

Voltage	MIN	MAX
Input high voltage (20μA)	2.0V	5.25V
Input low voltage (-0.2mA)	0.0V	0.80V
Output high voltage (-1.0mA)	5.0V	-
Output low voltage (100.0mA)	-	0.5V

User EEPROM

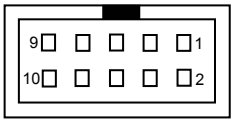
Includes 1kbit available EEPROM

Form Factor

32-bit / 33MHz PMC socket board

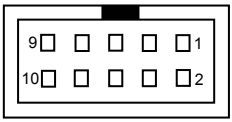
5.4.3 Pin Assignment

Video Input



PIN NO.	Function	PIN NO.	Function
1	GND	2	CH0 video in
3	CH1video in	4	GND
5	GND	6	CH2video in
7	CH3video in	8	GND
9	GND	10	GND

GPIO



PIN NO.	Function	PIN NO.	Function
1	IN0 External interrupt	2	GND
3	OUT0	4	NC
5	NC	6	GND
7	NC	8	+5V
9	GND	10	NC

■ 5.4.4 Dimensions

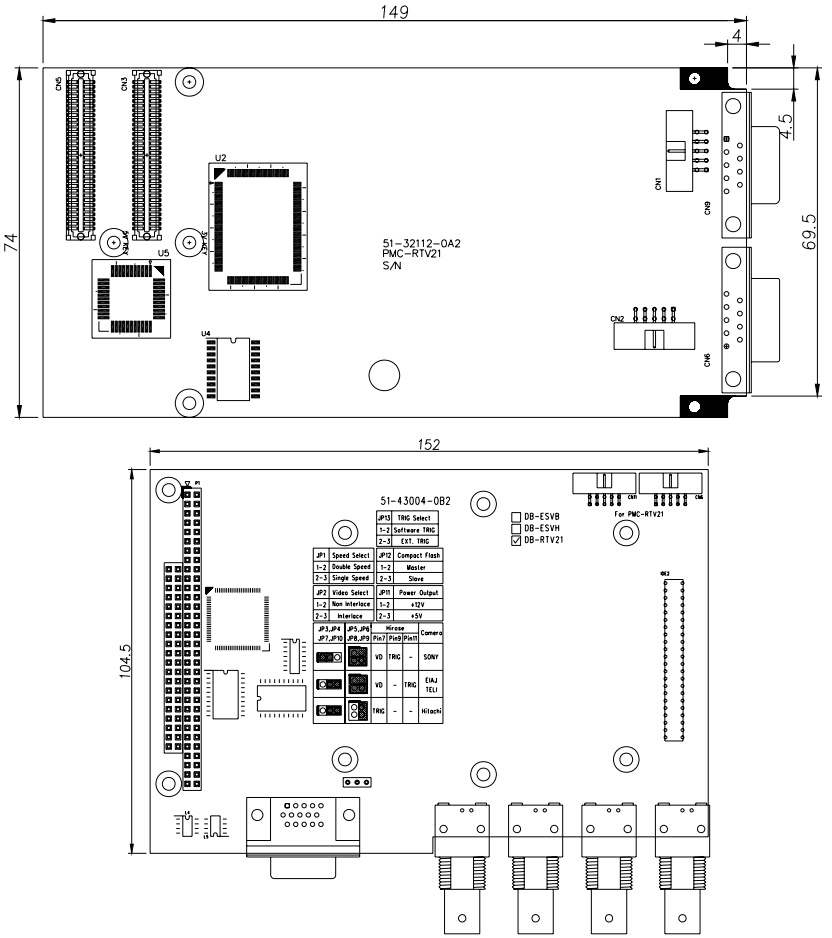


Figure 16. PCB layout of the PMC-RTV24G & DB-RTV24G

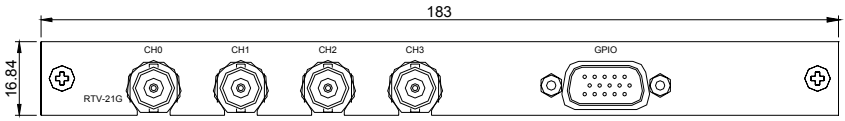


Figure 17. Front panel of PMC-RTV24G for GEME system

5.5 PMC-3534G

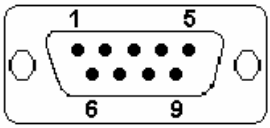
■ 5.5.1 Features

- IRQ and IO address automatically assigned by PCI plug-and-play
- 4 RS-232C communication ports with intelligent buffer
- High speed concurrent communication (max. 115200 bps)
- Suitable for modems, data display, data collection, telecommunication

■ 5.5.2 Specifications

- Compliant with PCI Spec.2.1
- Serial communication controller:
- 16C550A compatible
- System IO mapping:
- Assigned by PCI BIOS
- Shared IRQ
- Flow control
- Xon/Xoff control
- RTS/CTS control
- Port Capability:
- independent RS-232C compatible ports
- Baud rate: Each port can be configured to 50-115,200 bps

■ 5.5.3 Pin Assignment



Pin	RS-232
1	DCD, Data carrier detect
2	RXD, Receive data
3	TXD, Transmit data
4	DTR, Data terminal ready
5	GND, ground
6	DSR, Data set ready
7	RTS, Request to send
8	CTS, Clear to send
9	RI, Ring indicator

■ 5.5.4 Dimensions

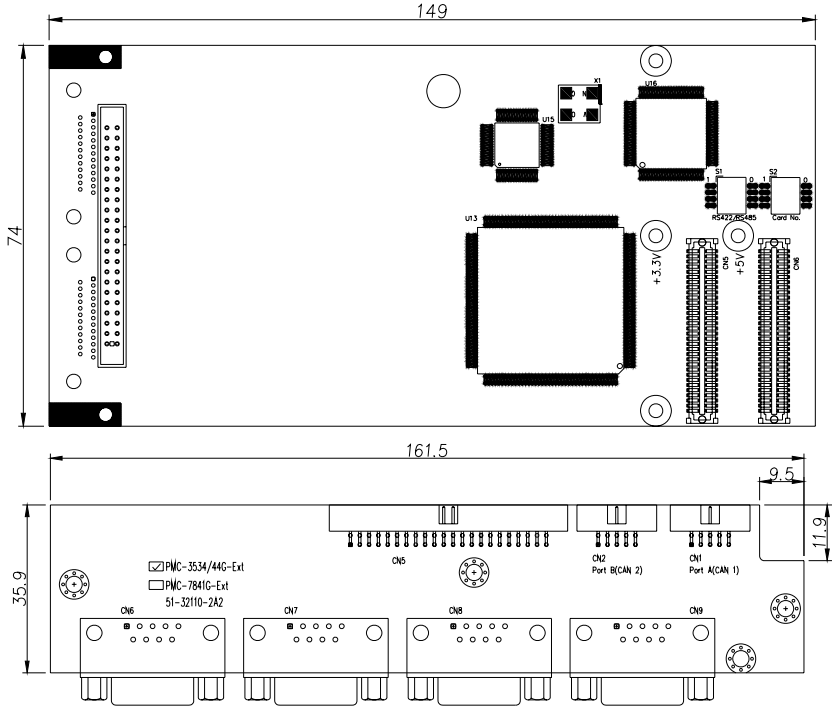


Figure 18. PMC-3534G PCB layout and extension card

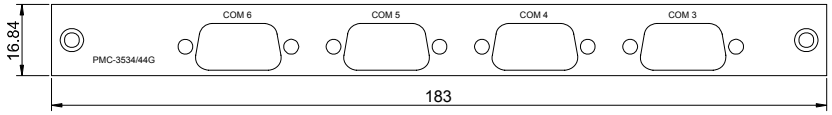


Figure 19. PMC-3534G Front panel

5.6 PMC-3544G

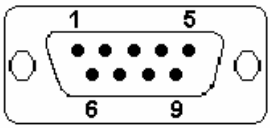
■ 5.6.1 Features

- IRQ and IO address automatically assigned by PCI plug-n-play
- communication ports with intelligent buffer
- RS-422/485 hardware selectable
- RS-485 with auto direction flow control
- High speed concurrent communications (max. 115200 bps

■ 5.6.2 Specifications

- Compliant with PCI Spec.2.1
- Serial communication controller:
- 16C550A compatible
- System IO mapping:
- Assigned by PCI BIOS
- Shared IRQ
- Flow control
- RS-485 auto direction
- Port Capability:
- 4ch RS-422/485 port (DIP switch select)
- Baud rate: Each port can be configured to 50-115,200 bps

■ 5.6.3 Pin Assignment



Pin	RS-422	RS-485
1	RX+	NC
2	TX+	NC
3	NC	NC
4	NC	DATA+
5	GND	GND
6	RX-	NC
7	TX-	NC
8	NC	NC
9	NC	DATA-

5.6.5 Dimensions

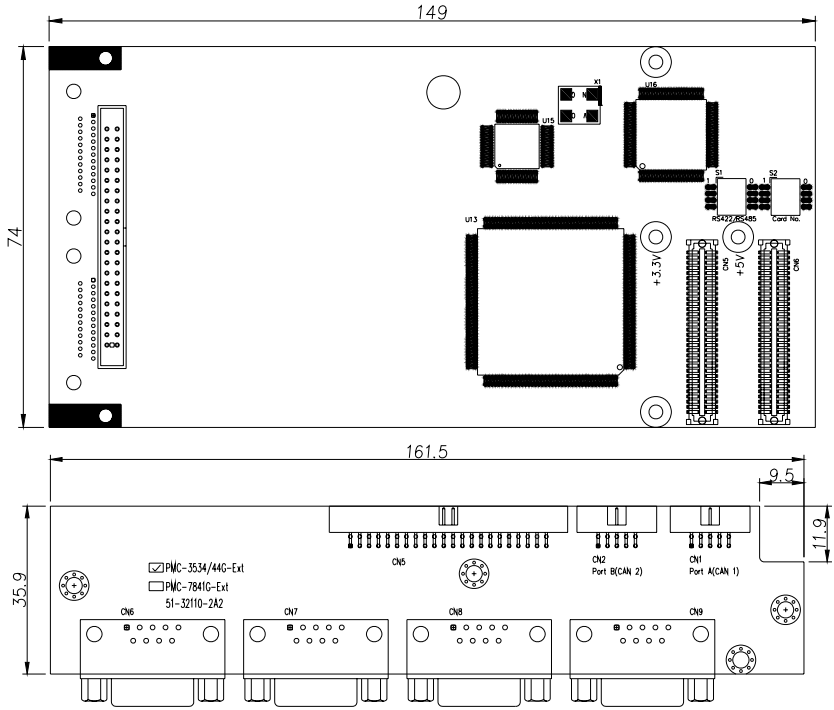


Figure 20. PMC-3544G PCB layout and extension card

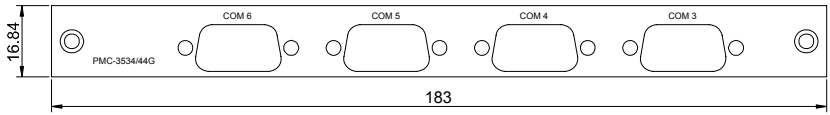


Figure 21. PMC-3544G front panel

5.7 PMC-7841G

■ 5.7.1 Features

The PMC-7841G is a Dual-Port Isolated CAN Interface Card with the following features:

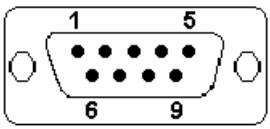
- Two independent CAN network operation
- Bridge support
- Compatible with CAN specification 2.0 parts A and B
- Optically isolated CAN interface (up to 2500 Vrms isolation protection)
- Direct memory mapping to the CAN controllers
- Up to 1Mbps programmable transfer rate

■ 5.7.2 Specifications

PMC-7841G Specification Table

Ports	2 CAN channels (V2.0 A, B)
CAN Controller	SJA1000
CAN Transceiver	82c250
Signal Support	CAN_H, CAN_L
Isolation Voltage	2500 Vrms
Operation Temperature	0 – 60° C
Storage Temperature	-20° – 80° C
Humidity	5% – 95% non-condensing
IRQ Level	Set by Plug and Play BIOS
I/O port address	Set by Plug and Play BIOS
Power Consumption (without external devices)	400mA @5VDC (Typical) 900mA @5VDC (Maximum)

■ 5.7.3 Pin Assignment



Pin	CAN
1	NC
2	CAN_L
3	Shield
4	NC
5	Case GND
6	NC
7	CAN_H
8	NC
9	NC

■ 5.7.4 Dimensions

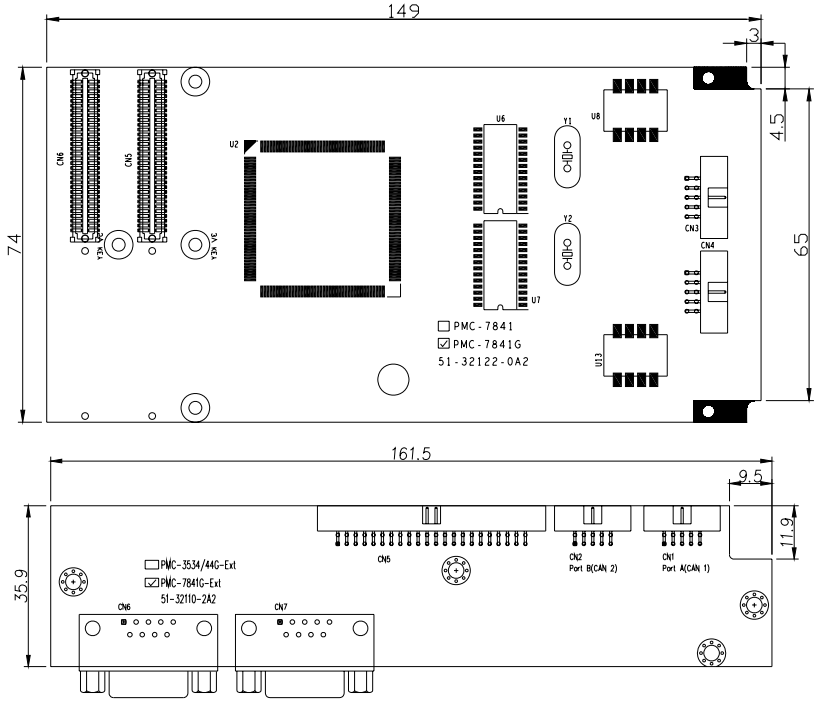


Figure 22. PMC-7841G PCB layout and extension card

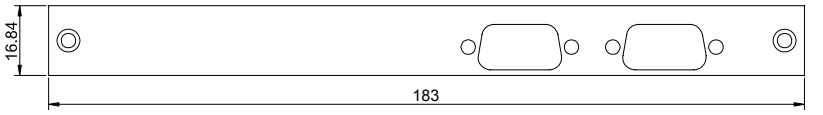


Figure 23. PMC-7841G front panel

5.8 PMC-7852G

■ 5.8.1 Features

General:

- One master has two HSL ports
- One port can drive maximum 32 modules
- One master can control maximum 63 slave I/O modules
- Maximum wiring distance for each port: 200m (serial wiring from master to last slave module)

Wiring:

- Connector: RJ45 (on both master controller and slave modules)
- Cable: Cat.5 100 Base/TX Ethernet cable, shielded preferred

Communications:

- Multi-drop full-duplex RS-422 with transformer isolation scheme
- Data Rate: 6Mbps
- I/O refresh rate: 30.1 μs x numbers of slave I/O modules (min: 3; max: 63)
- Communication model: single-master/multi-slave
- Communication method: command – response
- CRC12 and dedicate protocol for eliminating communication errors

■ 5.8.2 Specifications

PCI Controller:

- PCI local bus specification Rev. 2.1 compliance

Master Controller:

- Master controller: ASIC
- External Clock: 48MHz

Memory:

- 32KB SRAM – 12ns

Interface:

- RS-422 with transformer isolation
- Full duplex communication
- Selectable transfer speed by dip switch (Default 6Mbps)
- Two ports for one control master

Connector:

- RJ45 connector x 4 (H1A, H1B, H2A, H2B for PMC-7852G)

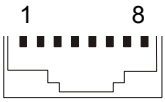
Interrupt:

- 32 bits Programmable timer

LED Indicator: Power status

- Operating Temperature: 0 to 600C
- Storage Temperature: -20 to 800C
- Power Consumption: +5V @500 mA typical

■ 5.8.3 Pin Assignment



PIN NO.	PIN OUT
PIN 1	NC
PIN 2	NC
PIN 3	RX+
PIN 4	TX–
PIN 5	TX+
PIN 6	RX–
PIN 7	NC
PIN 8	NC

■ 5.8.4 Dimensions

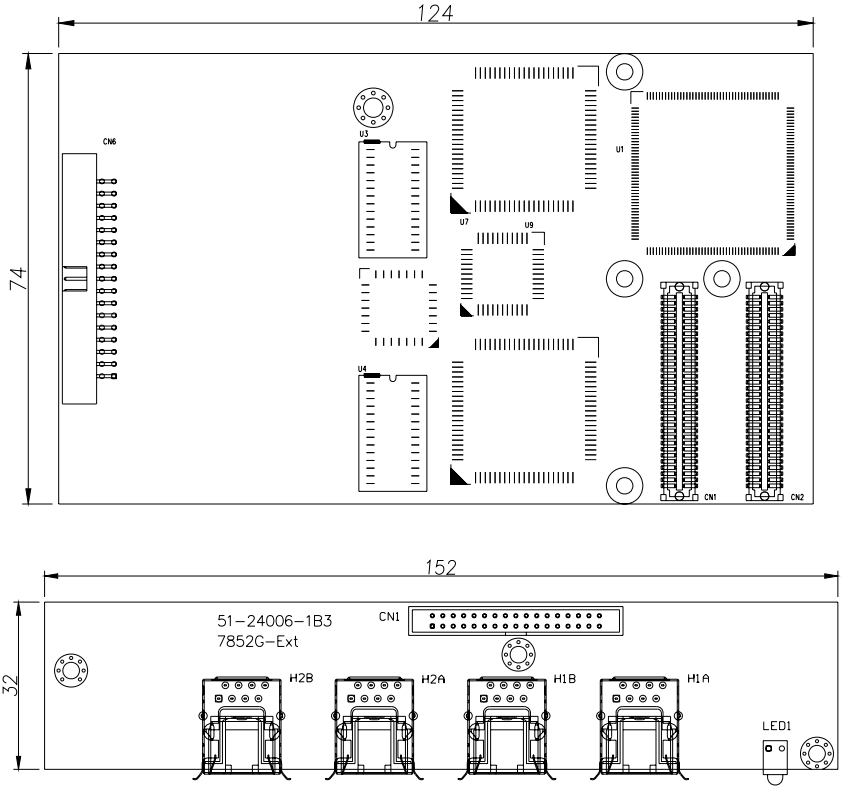


Figure 24. PMC-7852G PCB layout and extension module

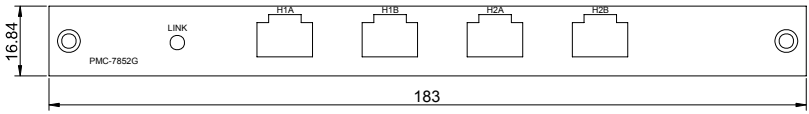


Figure 25. PMC-7852G front panel

Appendix A:
Important safety instructions

Read and follow all instructions marked on the product and in the documentation before you operate your system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User's Manual for future reference.
- The equipment can be operated at an ambient temperature of -10 to 55ºC.
- The equipment should be operated only from the type of power source indicated on the rating label. Make sure the voltage of the power source is correct when connecting the equipment to the power outlet.
- If your equipment has a voltage selector switch, make sure that the switch is set to the proper position for your area. The voltage selector switch is set at the factory to the correct voltage.
- For pluggable equipment, that the socket-outlet shall be installed near the equipment and shall be easily accessible.
- Place the power cord such a way that people cannot step on it. Do not place anything over the power cord.
- If the equipment is not use for long time, disconnect the equipment from mains to avoid being damaged by transient over voltage.
- All cautions and warnings on the equipment should be noted.
- Please keep this equipment from humidity.
- Do not use this equipment near water or a heat source.
- Lay this equipment on a reliable surface when install. A drop or fall could cause injury.
- Never pour any liquid into opening. This could cause fire or electrical shock.
- Openings in the case are provided for ventilation. Do not block or cover these openings. Make sure you provide adequate space around the system for ventilation when you set up your work area. Never insert objects of any kind into the ventilation openings.
- To avoid electrical shock, always unplug all power cables and modem cables from the wall outlets before removing covers.
- Lithium Battery provided (real time clock battery)
  "CAUTION – Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions"

- If one of the following situations arises, get the equipment checked by service personnel:
  A. The power cord or plug is damaged.
  B. Liquid has penetrated into the equipment.
  C. The equipment has been exposed to moisture.
  D. The equipment has not work well or you can not get it work according to user‘s manual.
  E. The equipment has dropped and damaged.
  F. If the equipment has obvious sign of breakage.
- Never open the equipment. For safety reasons, the equipment should only be opened by qualified service personnel.

Appendix B:
Warranty Policy

Thank you for choosing ADLINK. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully:

1. Before using ADLINK's products please read the user manual and follow the instructions exactly.

A. When sending in damaged products for repair, please attach an RMA application form.

3. All ADLINK products come with a one-year guarantee, repaired free of charge.
   - The warranty period starts from the product's shipment date from ADLINK's factory.
   - Peripherals and third-party products not manufactured by ADLINK will be covered by the original manufacturers' warranty.
   - End users requiring maintenance services should contact their local dealers. Local warranty conditions will depend on local dealers.

4. This warranty will not cover repair costs due to:
   a. Damage caused by not following instructions.
   b. Damage caused by carelessness on the users' part during product transportation.
   c. Damage caused by fire, earthquakes, floods, lightening, pollution, other acts of God, and/or incorrect usage of voltage transformers.
   d. Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals.
   e. Damage caused by leakage of battery fluid.
   f. Damage from improper repair by unauthorized technicians.
   g. Products with altered and/or damaged serial numbers.
   h. Other categories not protected under our guarantees.

5. Customers are responsible for shipping costs to transport damaged products to our company or sales office.

6. To ensure the speed and quality of product repair, please download a RMA application form from our company website: www.adlinktech.com. Damaged products with attached RMA forms receive priority.

For further questions, please contact our FAE staff.

ADLINK: service@adlinktech.c